

Strategisches
Kompetenz-Management

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Katja Nothnagel

Empirical Research within Resource-Based Theory

A Meta-Analysis of the Central Propositions

GABLER EDITION WISSENSCHAFT

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Der Resource-based View und – in enger Verbindung dazu – das Management von (Kern-)Kompetenzen haben in den vergangenen Jahren die Unternehmensführung nachhaltig beeinflusst. Wissenschaft und Praxis beteiligen sich gleichermaßen an Fragen der ressourcenorientierten Unternehmensführung und des Knowledge Managements. Die Schriftenreihe greift diese Entwicklung auf und schafft ein Forum für wissenschaftliche Beiträge und Diskussionen.

Katja Nothnagel

Empirical Research within Resource-Based Theory

A Meta-Analysis of the Central Propositions

With a foreword by Prof. Dr. Thomas Mellewigt

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To my parents, Karlheinz and Ulla, with love and gratitude.

Foreword

In the last ten years, the Resource-Based View (RBV) has become an important theoretical approach in strategic management. Concurrently, or at least since the contribution of Priem/Butler, there has been an increase in criticism of the theoretical and empirical power of the RBV. In this context Katja Nothnagel identifies three main deficiencies in the present discussion on the RBV:

1. An inadequate understanding of the central constructs and the empirically revisable hypotheses of the RBV.
2. An insufficient comprehension regarding the state of the art of the empirical research on the RBV and therefore of the empirical power of the RBV.
3. An inadequate systematic in respect to the methodical problems and the evaluation of alternative methods of research.

This is the starting point of Katja Nothnagel's thesis, in that she aims to contribute to the elimination of all three deficiencies.

Firstly, she concentrates on the ten most important theoretical publications on the RBV and thus identifies the three central constructs: resources, performance, and markets. These three central constructs are described in detail and defined. This represents an essential step in the establishment of a theory. Based on this she develops six central empirically revisable hypotheses for the RBV.

Subsequently, she presents a review of the empirical research. Based on a very extensive process of selection, Ms Nothnagel identifies 192 empirical investigations, which were published between 1984 and 2004. This chapter delivers a first-class overview of the empirical research on the RBV, which hitherto was not to be found in international research in this quality. It is a veritable treasure trove for all those, who in the future wish to indulge in empirical research on the RBV. Overall a large number of interesting facts has been divulged. Not surprisingly the focus of empirical research lies on intangible resources (72% of empirical investigations). On the other hand, it is astonishing that scarcity, non-limitability, and non-substitutability are hardly to be encountered in empirical research up to date.

Furthermore it is innovative and commendable, that Ms Nothnagel has carried out a vote counting as well as a meta-analysis to systematically test the performance of the RBV. The results of the vote counting show that 60% of the tests confirm a positive effect of resources on the success of an enterprise. Secondly, it is shown that the conditions of the factor market

have not been included in empirical tests. Consequently the meta-analysis confirms the significant but very slight correlation between resources and success of the enterprise. These small magnitudes of effect are, however, normal for the meta-analysis.

Finally, Ms Nothnagel addresses the methodical problem of the measurement of especially unobservable resources. From the 192 empirical investigations those that are particularly well qualified are identified as best practice. Furthermore a check-list for future empirical RBV-research has been developed.

In summary, it can be stated that in her thesis Ms Nothnagel has involved herself with a highly pertinent topic of research. Particularly of note from a theoretical point of view are the identification of the three central constructs of the RBV, the derivation of six empirically revisable hypotheses and the very extensive and competently integrated assessment of the literature. All three contributions are of great importance for the further development of the theoretical aspects of the RBV. Furthermore an important enhancement to the empirical side of the RBV has been made by the vote counting and meta-analysis. The empirical analysis has been performed very well and is informative and differentiated. I am sure, that no future empirical researcher in the field of the RBV will be able to ignore the opus of Ms Nothnagel.

Moreover extracts of the work have stood up to the first market tests. Excerpts of the thesis were presented to the Academy of Management in 2005 and at the conference of the Strategic Management Society in 2004, 2005 and 2007. Of further note is, that the work has profited from a period of research at the Ohio State University and a collaboration with the professors Barney and Leiblein.

The work presented fulfils all the requirements of international research standards. My wish is that this work finds acceptance in the community of RBV-researchers and strategic management. In my estimation it deserves to do so.

Univ.-Prof. Dr. Thomas Mellewigt

Preface

"The greatest achievement of the human spirit is to live up to one's opportunities and make the most of one's resources."

Luc de Clapiers, Marquis de Vauvenargues (1715-1747).

Writing the preface in one's book is usually the last thing a Ph.D. candidate has to do. It's the time and place to say thank you – and to acknowledge the support and encouragement of the advisor and faculty, fellow students, and, of course family and friends. And I certainly have a lot to be thankful for! But before I get to that, I want to take a moment to reflect on the past four years (unbelievable!) and to encourage everyone who is currently thinking about making the journey of writing a dissertation. And believe me – it really is a journey, one that you will only be able to understand if you experience it yourself!

I was excited at the beginning, studying previous dissertations, and reading – with anticipation, a little anxiety, and a tremendous respect – the prefaces of those authors, wishing, yet not really believing that I might get there as well. After several months of digging into the literature, I finally found the right research question and I felt ecstatic. Suddenly, I understood why everybody kept telling me that this is one of the best moments in the journey: I was like a teenager in love, one who could not stop smiling and who wanted to embrace the whole world. After that, I felt that I was on a roller coaster. I was satisfied while putting together my table of contents, yet dissatisfied as well, since I had to change it over and over and over again. I felt lucky, when finding the exact source I needed to cite, and stupid, while spending more than 8 hours on a single (and of course perfect) sentence. I felt proud, because part of my work got accepted for a presentation at a conference, and I also freaked out, because my computer thought the perfect time to give me a blue screen was two days before that conference. I was also excited to hear that I got a scholarship to Ohio State University, yet, devastated when I discovered (with the help of my fellow OSU colleagues) that I had to recode half of my database because of a beginner's mistake…

I could go on like this for many more pages. The important thing, however, is that in the end, after holding the hardcover version of my dissertation and passing my disputation, I just felt one thing, namely I was truly happy! And I still am!

Now, I guess I just want to say THANK YOU to all of you who helped me to get to this point: first of all, to my doctoral advisor Prof. Thomas Mellewigt, for your encouragement and your thoughtful guidance – I really enjoyed working with you. Also, to my fellow colleagues at

OSU, Assistant Prof. Mona Makhija, Associate Prof. Michael J. Leiblein, and Prof. Jay B. Barney, for our incredible discussions and the interest that you all showed in my work. It was an honor for me to work with you. Furthermore, to John Trelfa, for all your helpful corrections; and to IMPAQ AG, for giving me the support and the space I needed for my development. Also, to our "first generation", for so many helpful feedbacks during our doctoral seminars – this is to Leipzig, Paderborn, and Berlin and I hope we will see each other more often in the future. In particular, to Dr. Anna Krzeminska and Dr. Franziska König – I hope you know that I would not have survived this journey if both of you had not been part of it, and I will always cherish our time together at the SMS conferences. And of course, to all my friends, especially Maria Zwickler, Regine Lampert, Michael Bohn, Kerstin Dauscher, Gaby Strotmann, Erika Kunze, Steffen Groß, and Annette Kroh for your ongoing encouragement, your patience with me, and simply for your friendship. Furthermore, to Ernesto Heller, for helping me with my database, but most important, for showing me new perspectives in so many ways that I will never forget, as well as to Katja Lehn, for picking me up when I needed that, and celebrating with me every little step – you are always there for me and I thank you for that. And finally, I want to thank you, Mom and Dad, for all your support, help, time, effort, and encouragement – and most important, for always believing in me and raising me to believe in myself. I dedicate my dissertation to both of you, with deep love and eternal gratitude.

As the quote in the beginning said, "The greatest achievement of the human spirit is to live up to one's opportunities and make the most of one's resources." – this statement not only captures the essence of my dissertation, but also conveys what I have learned, personally, throughout the past four years. Writing a dissertation, and doing it with an open-heart, gets you intensely in touch with yourself. And I, for the first time, have truly appreciated all the resources that were provided to me, and all the opportunities that were – and still are – being presented to me…

Finally, to all the doctoral students out there: Good luck with your own journey – trust me, it is worth every bit of your investment!

Dr. Katja Nothnagel

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Table of Abbreviations

ABI	ABI/INFORM Complete™
AMJ	Academy of Management Journal
AMP	Academy of Management Proceedings
ASQ	Administrative Science Quarterly
BCS	Business Source Complete
BU	Business Unit
CEO	Chief Executive Officer
Cf.	Confer
DEA	Data Envelopment Analysis
DV	Dependent Variable
E.g.	For Example (exempli gratia)
EMJ	European Management Journal
et al.	Et Alii
etc.	Et Cetera
ETP	Entrepreneurship Theory and Practice
f	And the Following
FDA	Food and Drug Administration
ff	And the Followings
HPHR	High-Performance Human Resource Practices
HR	Human Resources
HRM	Human Resource Management
I	Inimitability
i.e.	That is (id est)
IBR	International Business Review
IDV	Independent Variable
IJHRM	International Journal of Human Resource Management
IJOPM	International Journal of Operations and Production Management
IJTM	International Journal Technology Management
IO	Industrial Organization
IT	Information Technology
JCR	Journal Citation Reports
JHTMR	Journal of High Technology Management Research
JIBS	Journal of International Business Studies

JKM	Journal of Knowledge Management
JMS	Journal of Management Studies
JoM	Journal of Management
JSBM	Journal of Small Business Management
LRP	Long Range Planning
MBV	Market-Based View
MD	Management Decision
MDE	Managerial and Decision Economics
MISQ	MIS Quarterly
MS	Management Science
NACE	Nomenclature Statistique des Activités Économiques dans la Communauté Européenne
NAICS	North American Industry Classification System
NS	Non-Substitutability
OS	Organization Science
p.	Page
R	Rareness
R&D	Research and Development
RA	Register Accountant
RBT	Resource-Based Theory
RBV	Resource-Based View
R-C-P	Resource-Conduct-Performance
ROA	Return on Assets
ROAA	Return on Average Assets
ROE	Return on Equity
ROI	Return on Investment
ROS	Return on Sales
SAT	Strategic Analysis Technique
SIC	Standard Industrial Classification
SIJ	Service Industries Journal
SMJ	Strategic Management Journal
TCE	Transaction Cost Economics
TECH	Technovation
TMT	Top Management Teams

TQM	Total Quality Management
V	Value
vs.	Versus

1 Introduction

"…as the empirical tests of resource-based theory continue to evolve, what becomes clear is that it is possible to derive testable assertions from this theory..."

Barney and Mackey (2005), p. 11.

Looking at resource-based theory (hereafter RBT) within the literature of the past two decades, the importance of firm resources for gaining sustainable competitive advantages and rents seems no longer questionable.[1] The literature provides a number of protruding theoretical papers,[2] as well as numerous empirical studies.[3] Yet, the heated debate still continues whether RBT can even be considered a theory.[4] Basically, opponents are questioning the empirical testability of its core tenets, also known as the tautology criticism: critics argue that the theory's primary assertions are true by definition, i.e., the theoretical constructs are defined in ways that are *tautological* and therefore not empirically testable.[5] The following exchange illustrates this argument:

> As a potential theory, the elemental resource-based view (RBV) is not currently a theoretical structure. (Priem and Butler (2001a), p. 22)
>
> [The authors conclude that the RBV], dealing directly with competitive advantage, is not amenable to empirical tests. (Priem and Butler (2001a), p. 27)
>
> Given the lack of empirical content in the RBV, any test will be weak. More work on definitions of constructs will be required before strong empirical tests are possible. (Priem and Buttler (2001b), p. 62)
>
> Measurement problems RBV researchers face, however, are similar to those other strategy researchers face, including those looking to test implications derived from transaction cost economics and agency theory. Moreover, Priem and Butler's argument is not that assertions derived from the 1991 [paper] are difficult to test but, rather, they are, in principle, not testable. (Barney (2001), p. 44)
>
> This type of theory can generate both testable empirical assertions and concrete managerial prescriptions… (Barney (2001), p. 52)
>
> The critical issue is […] whether at least some of the elements of that theory have been parameterized in a way that makes it possible to generate testable empirical assertions. (Barney (2001), p. 42)

In trying to resolve debates such as this one, thoroughly arguing and outlining the theory and defining its constructs is, as Priem and Butler (2001b) pointed out, necessary. Yet, as Barney

[1] Cf. Hoskisson et al. (1999), p. 417; Wernerfelt (1995), p. 172; Das/Teng (2000), p. 32.
[2] Among which I would like to emphasize the following: Wernerfelt (1984); Barney (1991); Rumelt (1984); Dierickx/Cool (1989); Grant (1991); Conner (1991); Mahoney/Pandian (1992); Peteraf (1993); Barney/Arikan (2001); Peteraf/Barney (2003); Barney/Mackey (2005).
[3] Here, I would like to expose the following as being very good examples of empirical resource-based studies: Markman et al. (2004); Ray et al. (2004); Knott (2003); McEvily/Chakravarthy (2002); Sharma/Vredenburg (1998); Miller/Shamsie (1996).
[4] Cf. Bromiley/Fleming (2000); Priem/Butler (2001a+b); Barney (2001); Peteraf/Barney (2003); Foss/Knudsen (2003).
[5] Cf. Priem/Butler (2001a), p. 23ff; Eisenhardt/Martin (2000), p. 1108; Barney (2001), p. 41ff.

(2001) even referred to as being the critical issue, looking at the empirical advancement on the RBT and its parameterizations within some of these studies seems to offer another fruitful alternative. For instance, in their empirical test of RBT, Miller and Shamsie (1996) addressed this problem five years previous to this debate, arguing that:

> …the resource-based view is just beginning to occasion systematic empirical study…the concept of resources remains an amorphous one that is rarely operationally defined or tested for its performance implications in different competitive environments…
>
> Indeed, in this article we attempt to move from a resource-based "view" toward a "theory" by progressing from description to testable prediction. A view is a product of evocative description, but theory demands the formulation of falsifiable propositions. (Miller and Shamsie (1996), p. 519)

Similarly Markman, Espina, and Phan (2004), who, within their empirical study on RBT, assess pharmaceutical patents as strategic resources in terms of Barney's (1991, 2001) four criteria, i.e., patents as valuable, rare, inimitable, and non-substitutable resources. The authors attended to this particular debate in claiming that:

> Our operationalization of inimitability and non-substitutability and testable hypotheses, however, rudimentary, inform this debate. Our new approach and measures suggest that – with the help of replicating studies with additional industries and with different lag analyses – a shift from a resource-based "view" toward a "theory" might be achievable. (Markman et al. (2004), p. 539)

In other words, looking at how researchers operationalized the theory's central propositions might explicitly contribute to this theoretical discussion. So far, my research shows that there have been only two efforts in arguing the empirical testability of these constructs through reviewing empirical resource-based work – the book chapter "The resource-based view: Origins and implications" by Barney and Arikan (2001) within "The Blackwell Handbook of Strategic Management" as well as the book chapter "Testing Resource-based Theory" by Barney and Mackey (2005) within "Research Methodology in Strategy and Management, Volume 2".[6] Within Barney and Arikan's contribution, the authors present an outstanding review on the origins and development of RBT. This review contains, amongst others, a detailed description of the theoretical history of RBT as well as of its core tenets compared with other explanations of sustainable firm performance differences, examples of several empirical tests outlined according to their research area and main findings, and managerial implications of RBT. In Barney and Mackey's contribution, the authors address the testability of RBT and its defiances, emphasizing the question of value and inimitability, i.e., how to measure the value and inimitability of resources. The authors point out that given that resources enable firms to create and implement strategies, a way to test for the value of these resources is to identify the link between them and specific strategies and then examine the

[6] Cf. Barney/Arikan (2001), p. 124ff; Barney/Mackey (2005), p. 1ff.

value these strategies create.[7] As for the inimitability, Barney and Mackey argue that the literature provides with several resource characteristics that make some resources more difficult to imitate than others and that the measurement challenges are rather due to the necessity of collecting resource-level information within firms over time.[8]

Both contributions decisively add to the development of RBT, yet, they both lack in systematically and thoroughly reviewing a broader basis of articles and rather concentrate on the consolidation of theoretical argumentations with sporadic supportive empirical examples.[9] Furthermore, explicit operationalization examples of both the propositions and the central constructs are not provided. So, relying only on a few examples, as well as the absence of a certain review systematic, obviously impedes the identification of best practices in this connection. Thus, to disambiguate the empirical testability of RBT, a comprehensive and methodical review of empirical resource-based contributions seems to be useful for comparison, yet, is still missing.

Besides the tautology discussion on the parameterizations of the theory's central constructs, which is obviously still not decided in favor of either party, another criticism disputes the empirical testability of RBT's central propositions: the suitability of research methods used by scholars to test the RBT.[10] Researchers have repeatedly asserted that there are hardly any methods up to the task of appropriately exploring resource-based theory:

> Although strategic management has advanced theoretically through the RBV, the methods that complement this theoretical view are less certain and need further development. (Hoskisson et al. (1999), p. 420)
>
> …advocates of the resource-based view have yet to solve the empirical problem posed by the inclusion of unobservables in the theory. (Godfrey and Hill (1995), p. 529)
>
> Scholars continue to ask, "How does one measure resources?" Usually, the question they are really asking is "How does one measure resources, easily?" The answer is, of course, that you don't measure resources easily. (Barney and Mackey (2005), p. 11)
>
> Researchers are grappling to develop ways to test the resource-based view of the firm. (Deephouse (2000), p. 1092)
>
> Empirical testing of the resource-based view faces significant challenges. (Hitt et al. (1998), p. 13)

[7] Cf. Barney/Mackey (2005), p. 2f.
[8] Cf. Barney/Mackey (2005), p. 9.
[9] Barney and Mackey (2005) rely on approximately ten examples, whereas considerably more examples can be found with Barney and Arikan's (2001), i.e., the authors outline 166 empirical RBT contributions according to their research area and major topic. Yet, Barney and Arikan do not give information on the propositions or on the operationalizations of the central constructs except for two articles (i.e., Henderson and Cockburn (1994) and Makadok (1999)); regarding the other 164 contributions, Barney and Arikan merely integrate and describe the major trends and findings in each of the different research areas.
[10] Cf. Godfrey/Hill (1995); Hoskisson et al. (1999); Rouse/Daellenbach (1999, 2002); Levitas/Chi (2002).

In other words, in overcoming these challenges with the right methods at hand might even render the tautology discussion, concerning the operationalization of the theory's central propositions, unnecessary. Regarding the literature, there are a few contributions addressing this issue and trying to evaluate suitable methods: for example, Godfrey and Hill (1995) evaluate the merit of qualitative methodologies such as multiple case studies, event histories, and ethnographic inquiries, arguing that those represent appropriate techniques for observing the effects of otherwise unobservable, idiosyncratic effects on business performance.[11] In general, the call for the use of qualitative methods is growing. For instance, Balogun et al. (2003) assess the value of methods such as interaction-discussion groups, self-reports, and practitioner-led research to identify a firm's resources, whereas Ambrosini and Bowman (2001) focus on cognitive maps to operationalize tacit knowledge.[12] Similarly to Balogun et al., Amabile et al. (2001) and Rynes et al. (2001) are also emphasizing the importance of academic-practitioner collaboration, while Rouse and Daellenbach (1999, 2002) focus on the advantage of inside-organizational work.[13] Dutta et al. (2005) suggest an estimation methodology, i.e., stochastic frontier estimation, to infer capabilities, while they delineate conditions that have to be met in order to measure these capabilities non-tautologically.[14] Shook et al. (2003) are even suggesting that there might not be a lack of appropriate methods but, instead, a lack of good academical training.[15]

Individually, all these approaches and suggestions offer very good advice on how researchers might be able to overcome the problem of resource operationalization, yet, looking at empirical studies within the literature, it becomes evident that they are not widely-used within empirical RBT research. What still seems to be missing in the literature is a comprehensive checklist giving scholars directions to best practices regarding the conduction of empirical RBT studies, i.e., a checklist comprising both best practices from an empirical RBT review as well as an evaluation of the suitability of those methods mentioned above.

Finally, while putting all the attention on the tautology and empirical testability of the central propositions of RBT, another deficit appears: The literature still fails to present and agree on the RBT's central propositions. So far, there has only been one attempt by Barney and Arikan (2001) to outline central RBT propositions, which are, however, not complete, still very

[11] Cf. Godfrey/Hill (1995), p. 531.
[12] Cf. Balogun et al. (2003); Ambrosini/Bowman (2001).
[13] Cf. Amabile et al. (2001); Rynes et al. (2001); Rouse/Daellenbach (1999, 2002).
[14] Cf. Dutta et al. (2005).
[15] Cf. Shook et al. (2003), p. 1231.

generic and need to be refined.[16] And because of this lack of understanding, comprehensively integrating the empirical findings according to the central propositions is nearly impossible. Thus, unique statements towards the empirical corroboration of RBT are not possible at the moment; empirical resource-based work exists of numberless individual stand-alone studies.

1.1 Objectives

As the discussions above show, there appear to be three main deficits in RBT:

(1) a lack of understanding towards the RBT's central – empirically testable – propositions;
(2) a lack of understanding towards the empirical validation of RBT, i.e., no thorough efforts towards the accumulation and integration of research findings; and
(3) a lack of systematically addressing the methodological problems and evaluating a broader basis of more suitable methods.

Within this dissertation I aim to address and clear each of these three deficits.

In order to address the ***first deficit***, i.e., *the lack of understanding towards the RBT's central propositions*, I will derive those propositions through building cumulatively upon the research of others. Thus, I will set out by taking a brief, yet close look at the theoretical argumentations on the RBT's core assertions within the relevant literature, in order to first infer on the central theoretical constructs. Here, I especially focus on and combine ten of the most relevant publications within the RBT: seven core RBT papers, i.e., Wernerfelt (1984), Barney (1986, 1991), Dierickx and Cool (1989), Grant (1991), Mahoney and Pandian (1992), and Peteraf (1993); two additional papers addressing the criticism regarding RBT, i.e., Barney's (2001) discussion with Priem and Butler (2001) and Peteraf and Barney's (2003) discussion with Foss and Knudsen (2003); and one additional paper conducting an overview of RBT, i.e., Barney and Arikan (2001).[17] Concluding that the relevant literature basically focuses on the relationships between the three central constructs of 'resources', 'performance', and 'markets' and each of their conditions, I will then outline these relationships while looking at the constructs' interconnections. Accordingly, six central propositions within the RBT will be derived. Furthermore, I will address the tautology discussion in detail, to show that both parties tend to be talking at cross-purposes.

[16] Cf. Barney/Arikan (2001), p. 141f.
[17] These publications are relevant in terms of their impact on resource-based work in general as can be seen through their citation impact factors.

In order to assess the empirical testability of these propositions and address the ***second deficit***, i.e., *the lack of understanding towards the empirical validation of RBT*, I will analyze 192 empirical studies published between 1984 and 2004, which tested resource-based hypotheses. Here, I will integrate both qualitative and quantitative research findings. Therefore, I will conduct a narrative review, concentrating on the following information: (a) how did researchers operationalize the central constructs, i.e., outlining parameterizations to demonstrate the constructs' empirical testability and (b) how did researchers operationalize the central propositions, i.e., outlining empirical examples testing these six propositions. I will then assess the overall empirical corroboration of RBT by integrating quantitative research findings through conducting both vote-counting and meta-analyses.[18] Here, I will solely concentrate on those studies that statistically tested the six central propositions, which will reduce the original sample to about 50% of the studies.

In overcoming the ***third deficit***, i.e., *the lack of suitable methods to test RBT*, I will analyze the methodological research problems within RBT more closely and offer an evaluation of suitable research methods. As Hoskisson et al. (1999) point out it is due to the emphasis on the idiosyncratic nature of a firm's resources and capabilities that empirical testing of the resource-based theory faces great challenges.[19] The power of resource-based theory in explaining sustainable performance is based upon strategic resources, i.e., valuable, rare, inimitable, and non-substitutable resources. Some of these resources are by their nature unobservable – e.g., tacit knowledge, organizational culture, etc. – and argued as such to especially give rise to sustainable competitive advantages due to high barriers of imitation.[20] Accordingly, empirical testing of these unobservable resources and their effects on firm performance seems to be difficult. Through the review of the 192 empirical papers I want to resume these methodological problems by looking at how researchers conducted their research, which problems in fact occurred, and which methods researchers chose to overcome these problems. Based on these results, I will then apply the findings and best practices obtained from the review to provide a concise checklist for future empirical research on RBT.

1.2 Structure

According to the objectives presented above, this dissertation is structured as follows:

[18] "The value of empirical management research is profoundly augmented if it enables its readers to infer credible scientific generalizations that can inform management practice. Such generalizations are best based on meta-analyses, and meta-analyses are enriched by encompassing a large number of high-quality replication studies." Eden (2002), p. 841.
[19] Cf. Hoskisson et al. (1999), p. 420.
[20] Cf. Godfrey/Hill (1995), p. 523; Rouse/Daellenbach (1999), p. 488 and (2002), p. 965.

The ***second chapter*** begins with briefly concluding on 'what is theory' in order to be able to assess the theoretical character of RBT. Next, theories within the field of strategic management will be outlined after providing the necessary definitions on strategy and the strategic management field. Afterwards, RBT will be placed within the context of strategic management, giving an overview of its historical development as well as its main assumptions. Here, I will also outline the main theoretical papers in detail, concentrating on the central theoretical constructs, i.e., on resources, performance, and markets and their conditions. After that, the relationships between these constructs will be disclosed and a framework on RBT will be presented. Consequently, these relationships will be transformed into the six central propositions of RBT. In comparison to these six propositions there will also be a brief discussion on Barney and Arikan's (2001) propositions, which are – as mentioned above – the only scholars trying to derive central resource-based propositions. Finally, this chapter concludes with addressing the most frequently argued criticism, while especially focusing on the tautology claim of Priem and Butler (2001). Since it seems that one can refute this criticism, speaking of resource-based *theory* appears admissible.

The ***third chapter*** encompasses the narrative review on empirical work within the RBT, i.e., the analysis of 192 studies published between 1984 and 2004. This chapter begins with outlining the database selection process, including a short overview of the articles contained within the database, regarding the year and journal they were published in, as well as their main research area. Afterwards, I will concentrate on the operationalization of the three central theoretical constructs – resources, performance, and markets – and their conditions in order to prove their empirical testability. Additionally, a systematic categorization of interesting examples on the operationalization of each of these three constructs will be provided. Also, I will present guidelines in terms of best practices on measuring resources, performance, and markets in this connection. Regarding the former, I will concentrate on the constructs used to measure resources and evaluate the items used represent the four resource conditions. Based on these items, I will consolidate key-items on how to best measure strategic resources and conclude on a general measurement scale in this respect. Finally, regarding the testing of the six central RBT propositions, this chapter closes with outlining prime examples from the review for each of the propositions.

The ***fourth chapter*** conducts vote-counting as well as a meta-analysis on RBT, i.e., a quantitative integration of research findings of the empirical papers as regards to the central propositions presented in the second chapter. Therefore, I will first refine the database and

only include articles, which address either one of the six central propositions. Thus, this chapter begins with addressing the hypotheses' foci regarding different resource-conduct-performance relationships. For further inclusion, the articles' hypotheses have to focus on resources as at least one independent variable, and performance as at least one dependent variable, as well as offer a statistical outcome for the vote counting procedures and a usable effect size within their statistics for the meta-analysis. The final database for the vote counting will thus contain 86 studies and 824 tests, whereas the final database for the meta-analysis will contain 59 suitable studies and 240 tests. Before presenting the results, both methods will be briefly explained, outlining the procedures as well as advantages and disadvantages. The *vote counting results* – categorized into significantly supported, significantly counter, and non-significant tests – will be providing insights into (a) the overall statistical significance for the different independent and dependent variables, i.e., resource-types, resource-categories, and resource-conditions, as well as performance-conditions and performance-levels; (b) the corroboration attempts of the central propositions with detailed information on their different resource levels (i.e., resources in general, resource-types, resource-categories, as well as the three most tested resource-sub-categories and their performance impact); and (c) results of the measures used for the 10 main tested independent variables. The meta-analysis aims at providing effect sizes for the proposed relationships between strategic resources and performance. Therefore, those results will be presented according to the different propositions and, in addition, complemented with results from further moderator analyses (e.g., resource-categories, resource-sub-categories, performance-levels, etc.). A discussion on each of the vote counting and meta-analysis results will conclude this chapter.

Within the ***fifth chapter,*** I will concentrate on the research challenges within RBT and evaluate alternative research methods to overcome these challenges. The chapter begins with addressing the methodological challenge of measuring unobservables by briefly outlining different unobservability degrees for different resources. Then, in order to derive best practices from the review on how to get to the core of these unobservables, I will provide some information on the research designs (e.g., basic type of study, data collection methods) of the 192 empirical studies and outline prime examples in this regard. Based on these results, I will develop criteria to assess the suitability of research methods for RBT, which will then be applied to evaluate alternative research methods. Those methods will be identified through an extensive literature review as well as five interviews with methodological experts in the

fields of economics, psychology and sociology.[21] They will include various interviewing techniques for individuals and groups, observational approaches, as well as analytical approaches. Chapter five ends with developing general guidelines and best practices from the review, which will result in a checklist for future empirical RBT research.

In the ***sixth chapter***, the arguments will be summarized and conclusions for RBT and empirical research in this connection will be discussed. Additionally, I will outline limitations as well as a future research agenda for resource-based research, both theoretically and empirically.

The following Figure 1 gives an overview of the dissertation structure:

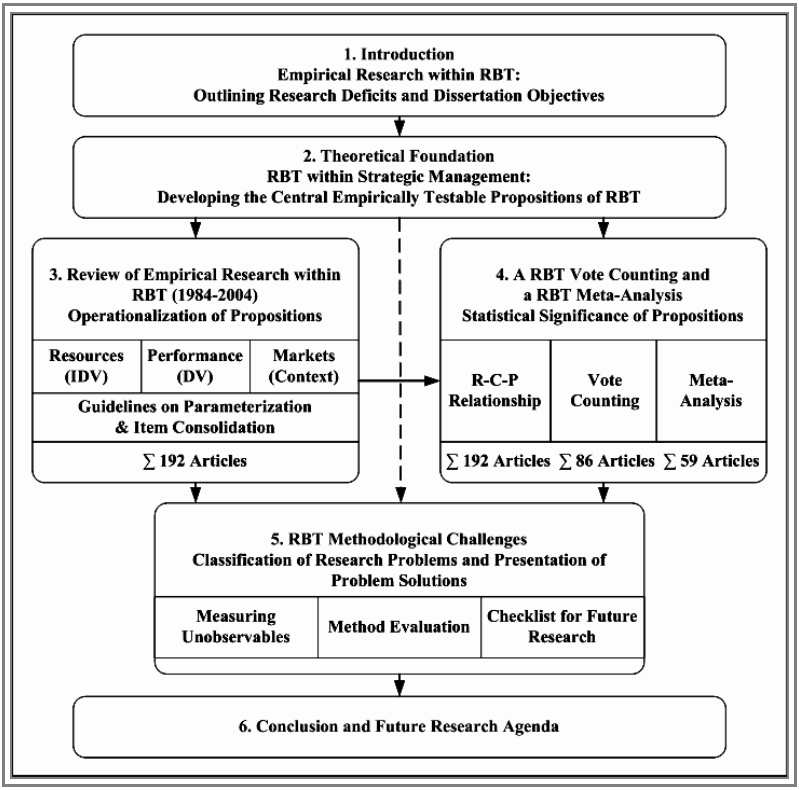


Figure 1: Dissertation Structure

[21] The interviews are listed in the appendix.

Thus, the purpose of this dissertation is to prove what the introductory quote from Barney and Mackey (2005) so succinctly resumes – that the evolving empirical tests of RBT will show that it is possible to derive *testable assertions* from this theory.

2 The Central Propositions of Resource-based Theory

"…the process of building theory is itself full of internal conflicts and contradictions."

Sutton and Staw (1995), p. 372.

According to Sutton and Staw (1995), building a theory is a complex process and there is still a lack of agreement amongst scholars on what theory is and should be.[22] Varied interpretations can be found whether a model or a framework equates a theory or whether being falsifiable is seen as a sine qua non for the very existence of a theory.[23] As Merton (1967) asserts:

> …the word theory threatens to become meaningless. Because its referents are so diverse – including everything from minor working hypotheses, through comprehensive but vague and unordered speculations, to axiomatic systems of thought – use of the word often obscures rather than creates understanding. (Merton (1967), p. 39)

Following Venkatraman and Ramanujam (1986), several theories can be found within strategic management, all basically trying to explain firm performance, to clarify performance differences between firms and to give prescriptive implications on how to gain competitive advantages and, hence, sustainable performance.[24] Recently, in trying to accomplish these objectives, there has been a shift of perspective: before, researchers were focusing on firm-external factors, whereas now firm-internal factors (i.e., resources) come to the fore. The emergence of this resource-based perspective has also triggered a new discussion within strategic management on the subject of what theory is and what it is not. Participants are basically arguing whether this resource-based perspective currently known as the resource-based *view* (RBV) can actually be regarded as resource-based *theory* (RBT).

In the following, it will be argued that the resource-based perspective has the potential to be called a theory. Therefore, the *first* section will give a brief summary on what can be seen as theory, focusing on six basic guidelines. The *second* section will provide definitions on strategy, strategic management, and its theories as well as an overview of the latest management theories within this field. Afterwards, the *third* section will outline RBT, giving details on the theory's history, its assumptions, and central constructs and finally leading over to the theory's framework and its central propositions within the *fourth* section. Additionally, there will be a brief discussion on the theory's propositions discussed within the literature so far, here the only one being the contribution of Barney and Arikan (2001). The *fifth* and final

[22] Cf. Sutton/Staw (1995), p. 371.
[23] Cf. Sutton/Staw (1995), p. 371. For more details on what theory is, see Dubin (1976), Freese (1980), Merton (1967), and Weick (1989).
[24] Cf. Venkatraman/Ramanujam (1986), p. 801. "…performance improvement is at the heart of strategic management." Venkatraman/Ramanujam (1986), p. 801.

section will summarize and look into the theory's main criticism, concluding that we can speak of a resource-based theory.

2.1 What is Theory?

Overall, theory can be seen as the answer to the question of *why*; the emphasis is on explaining causal relationships of occurring phenomena.[25] There are several definitions in the literature: According to Weick (1989), "*theory* is a dimension rather than a category […], which means that the more fully a generalization satisfies the criteria of a theory, the more it deserves the label *theory*."[26] Gioia and Pitre (1990) define theory as "any coherent description or explanation of observed or experienced phenomena."[27] Focusing on the scope of a theory, Poole and Van de Ven (1989) argue that "a good theory is, by definition, a limited and fairly precise picture. It does not attempt to cover everything and would fail to meet the parsimony criterion if it did. Scope conditions are one means of expressing the limitations of theories. Less evident, but as effective, is reliance on a limited, carefully prescribed set of assumptions and explanatory principles."[28] In this dissertation I adopt Poole and Van de Ven's (1989) notion on theory's scope and follow Christensen et al.'s (2002) definition that theory is "…a statement of what causes what, and why, and *under what circumstances*."[29]

In trying to agree on the question 'what is theory', Sutton and Staw (1995) take the interesting approach to first agree on what theory is *not*.[30] Here, they conclude five aspects that do *not* constitute a theory: (1) if contributions merely reference theoretical work explained elsewhere without fully outlining the theory themselves, yet, still trying to further develop or test the theory;[31] (2) if only a list of constructs is provided and construed as theory, yet, a theory also has to explain why these constructs are of interest and how they are interconnected;[32] (3) if contributions just rely on diagrams or figures instead of also providing verbal explanations on why the proposed interconnections will be observed;[33] (4) if a theoretical model simply states hypotheses, because hypotheses only determine what is expected to occur and not why;[34] and

[25] Cf. Sutton/Staw (1995), p. 378.
[26] Weick (1989), p. 516f (emphasis in the original).
[27] Gioia/Pitre (1990), p. 587.
[28] Poole/Van de Ven (1989), p. 562.
[29] Christensen et al. (2001), p. 3 (emphasis in the original).
[30] Cf. Sutton/Staw (1995), p. 372. "Though there is conflict about what theory is and should be, there is more consensus about what theory is *not*." Sutton/Staw (1995), p. 372 (emphasis in the original).
[31] Cf. Sutton/Staw (1995), p. 372f.
[32] Cf. Sutton/Staw (1995), p. 375; see also Weick (1989), p. 517; Homans (1964), p. 957.
[33] Cf. Sutton/Staw (1995), p. 376. "Good theory is often representational *and* verbal." Sutton/Staw (1995), p. 376 (emphasis in the original).
[34] Cf. Sutton/Staw (1995), p. 377.

(5) if data is inappropriately interpreted as theory, because data only describes which phenomenon was observed and it is theory that explains why this phenomenon was observed.[35]

Furthermore, Popper (1959) argues an additional request for what good theory must *not* be: tautological.[36] Tautologies in this connection are statements which are always true and thus cannot be empirically tested, i.e., these statements do not have empirical substance.[37] Here, statements can be tautological if (a) their central constructs are defined in terms that they are true by definition[38] or (b) their central constructs lack empirical testability due to their metaphysical character.[39]

According to these six aspects, a theory should thus (1) be always outlined in full, including its historical development and assumptions;[40] (2) outline and explain the constructs of interest while also focusing on their interconnectedness;[41] (3) additionally provide representational models and figures;[42] (4) derive central propositions;[43] (5) use data to endorse the theory;[44] and (6) good theory must also be falsifiable, i.e., the definitions of the central constructs must not be tautological, as well as the general empirical testability of these constructs must be assured.[45] Regarding resource-based theory, the aspects (1)-(4) as well as the theoretical assessment of (6) will be provided within this chapter, whereas the empirical evaluation of (5) and (6) will be accomplished subsequently within chapter 3 and 4. Before assessing the theoretical character of RBT, there will be a short review of theories within strategic management to properly place RBT within the context of this field.

2.2 Theories within Strategic Management

The following section will begin by briefly outlining relevant terms and definitions regarding *strategy*, *strategic management*, *and its theories*, as well as *competitive advantage* and

[35] Cf. Sutton/Staw (1995), p. 374. In Mintzberg's (1979) words: "The data do not generate theory – only researchers do that." Mintzberg (1979), p. 584.
[36] Cf. Popper (1959).
[37] Cf. Sober (1984), p. 63.
[38] Cf. Bacharach (1989), p. 505.
[39] Cf. Agassi (1971); Boland (1997). Here, there is always the possibility to interpret every situation in favor of ones own explanation. Cf. Lüdeke et al. (2006), p. 561ff.
[40] Regarding RBT, see chapter 2.3.1 as well as chapter 2.3.2.
[41] Regarding RBT, see chapter 2.3.3 for the central constructs as well as chapter 2.4 for outlining the constructs' interconnectedness.
[42] Regarding RBT, see the framework within chapter 2.4.1.
[43] Regarding RBT, see chapter 2.4.2.
[44] Regarding RBT, the review within chapter 3 as well as the meta-analysis within chapter 4 will both endorse the theory.
[45] Regarding RBT, the general falsifiability of the theory will be discussed within chapter 2.5 and outlined throughout the review within chapter 3 as well as the meta-analysis within chapter 4.

superior performance. Afterwards, a short overview of the evolution of the strategic management field will be given, to facilitate the comprehension of the subsequent placement of RBT.

2.2.1 Definitions: Strategic Management and Management Theories

In the course of time, the relative inflationary exertion of the terms *strategy* and *strategic* lead to conceptual dishevelment; this becomes especially apparent regarding the different definitions in the respective literature.[46] Originally, this definition accrued from a military context[47] and was assigned to business economics within the context of game theory in the middle of the 20th century.[48] Since then it has been used in manifold ways, resulting in a multiplicity of divergent interpretations. Nevertheless, one can retain two central common characteristics of the strategy definition from all the different definitions occurring in the literature: the long-term perspective of strategy as well as the orientation on top level objectives of thinking, decision making, and acting.[49]

Following a definition of Welge and Al-Laham (2001), *strategy* defines a firm's main functions, as well as the way it tries to reach its strategic objectives with its own resources and capabilities, in order to achieve a competitive advantage to secure the long-term firm development,[50] whereas following Drucker (1994, 2006) *strategy* defines a firm's theory of how it can gain superior performance in the markets within which it operates.[51] In this dissertation, both definitions are combined to describe ***strategy***, arguing that the chain of logic goes from a firm's resources and capabilities to achieving a competitive advantage to gaining superior performance and, hence, securing the long-term firm development.[52]

A ***competitive advantage*** in this connection exists when a value creating strategy is uniquely implemented by the firm and not its competitors; this advantage is *temporary* when competitors are able to duplicate this strategy and, hence, it is *persistent* when competitors

[46] Cf. Welge/Al-Laham (2001), p. 12; Kreikebaum (1987), p. 1898; Gälweiler (1990), p. 55. An overview as well as a systematic categorization approach for different strategy interpretations for both the German and Anglo-American literature can be found within Welge/Al-Laham (1992a), p. 165ff.
[47] From an etymologic-historical perspective, *strategy* originated from a military background, being compounded of the Greek words "Stratos" (= army) und "Agein" (= to lead). Cf. Gälweiler (1990), p. 58ff and p. 65ff; McKiernan (1997), p. 791.
[48] In 1944, Neumann and Morgenstern, the inventors of the so called game theory, transferred the term strategy into the economics. Strategy was then understood as a series of single steps which were independent from each other but were all focusing on a certain objective.
[49] Cf. Gälweiler (1990), p. 66; Welge/Al-Laham (2001), p. 19.
[50] Cf. Welge/Al-Laham (2001), p. 19; and similarly see Aaker (1989), p. 4ff.
[51] Cf. Drucker (1994, 2006).
[52] See also Peteraf/Barney (2003), p. 316.

have failed duplication efforts.[53] Here, value creation refers to enhancing efficiency and/or effectiveness as well as to an additional benefit on the market that is perceivable by the customer.[54] Because developing a competitive advantage requires time and consumes resources, one should not change the strategy too often and should rather aim at a sustainability of these advantages.[55] As a prerequisite for gaining a competitive advantage, a firm has to own *success-potentials*, which will work as strategic control elements in this connection, and represent a firm's potentials that are responsible for the ultimately possible and attainable degree of economical efficiency.[56] Hence, a strategy's formulation objective should be to enable an extensive exploitation of strategic success-potentials and, accordingly, a strategy's priority should be to secure and extend these potentials.[57] Regarding ***superior performance,*** it defines the production of *economic rents*, i.e., the value firms generate when their resources exceed the expectations; rents are *temporary* when these expectations adjust to incorporate the higher than expected level of value and they are *persistent* when these expectations do not adjust.[58]

In this connection, ***strategic management*** is designated as a process to transform and implement strategies within the firm.[59] From a conceptual and holistic perspective, strategic management describes the planning, controlling, and coordination of the firm's development, while actively taking environmental changes into consideration. This is done with the purpose of achieving an optimal, proactive arrangement of external environmental relationships and

[53] Cf. Barney/Arikan (2001), p. 140f; Simon (1988), p. 4; Hungenberg (2000), p. 66.
[54] Cf. Simon (1988), p. 4; Porter (1999), p. 51 and (1989), p. 21; Hungenberg (2000), p. 65. Because competitive advantages are resulting from a comparison between competitors, they are understood as relative not absolute advantages. Cf. Corsten (1998), p. 11.
[55] Cf. Porter (1984), p. 159ff and p. 215f as well as (1999), p. 55.
[56] Cf. Macharzina (1999), p. 209f; Welge/Al-Laham (2001), p. 121 and (1992a), p. 360; Jenner (1998), p. 1313; Gälweiler (1990), p. 24ff.
[57] Cf. Macharzina (1999), p. 209f; Bea/Haas (2001), p. 503; Gälweiler (1990), p. 24.
[58] Cf. Barney/Arikan (2001), p. 140. Often, researchers define competitive advantage as superior financial performance, as Winter (1995) observes, yet "beyond this point, however, conceptual clarity starts to fade. The idea of superior financial performance may be evoked by a range of phrases such as 'above normal returns', high quasi-rents', value-creation', and other near-synonyms for 'making money.'" Winter (1995), p. 168. Similarly, Peteraf and Barney (2003) who agree with Foss and Knudsen (2003) that it is common to define competitive advantage in performance terms: "Indeed, it is not uncommon for strategists trained in economics to think of competitive advantage in such terms. Ghemawat and Rivkin (1999, p. 49), for example, state 'A firm … that earns superior financial returns within its industry (or strategic group) over the long run is said to enjoy a competitive advantage over its rivals.' Similarly, Thomas (1986, p. 3) asserts 'Firms with persistent high relative profitability are said to possess competitive advantage…'. Besanko et al. (2000) define competitive advantage as an advantage in economic profits relative to the average competitor in an industry. Profits refer to economic profits, which equal sales revenue minus economic (opportunity) costs." Peteraf/Barney (2003), p. 319. Yet, regarding the RBT, it will become important to be able to separate these two concepts as will be outlined in chapter 2.3.3.2.
[59] Cf. Welge/Al-Laham (2001), p. 19.

internal firm structure.[60] Against the background of extensive analysis of chances and risks (firm's environment) as well as of strengths and weaknesses (a firm's internal situation) of a firm, the objective of strategic management is to secure long-term firm success.[61] Following these analysis results, the central task of strategic management should, therefore, comprise the search for strategic success-potentials as well as their building, extension, and maintenance as a basis for gaining as sustainable a competitive advantage as possible.[62]

The present scientific status of strategic management shows a breadth of different and for the most part, disconnected management approaches, i.e., ***strategic management theories***, which try to explain a firm's success and reduce it to the existence of *strategic success-potentials*.[63] Yet, until now, a consistent and comprehensive approach for explaining the source, development, and maintenance of competitive advantages and, hence, sustainable superior performance differences, does not exist. Next, I will give a brief overview of the evolution of the strategic management field, focusing on its alternating theories.

2.2.2 Strategic Management Theories

According to Hoskisson et al. (1999), the evolution of the strategic management field can be stated as being impressive, since accruing from a general management course in business school at the beginning of the 1960s to a firmly established field in the study of business and organizations.[64] Traditionally, as outlined above, research within this field of strategic management tried to explain performance differences between firms, while focusing on different business concepts that might affect firm performance. In the following, the prominent theories developed within the field of strategic management will be briefly reviewed, focusing on the shift between an inside-out and outside-in perspective while trying to explain performance.[65]

Throughout the 1960s, strategic management theories primarily concentrated on internal firm characteristics to explain performance differences, i.e., the strength and weaknesses of each individual firm. Important representatives of this time were Andrews (1971), Learned et al.

[60] Cf. Welge/Al-Laham (1992b), p. 2355f; Macharzina (1999), p. 490.
[61] Cf. Hungenberg (2000), p. 4f; Welge/Al-Laham (1992b), p. 2356.
[62] Cf. Welge/Al-Laham (1992b), p. 2356; Gälweiler (1990), p. 24. Similarly, Pümpin (1992), p. 19ff, who uses the term *strategic success-position*.
[63] Cf. Bamberger/Wrona (1996b), p. 130; Bea/Haas (2001), p. 23; Rühli (1994), p. 33; Sanchez/Heene (1997), p. 304; Theuvsen (2001), p. 1644.
[64] Cf. Hoskisson et al. (1999), p. 418.
[65] Cf. Hoskisson et al. (1999), p. 417; Rühli (1995), p. 93; Theuvsen (2001), p. 1644. For a comprehensible overview of the historical development of strategic theory since the 1950th see i.a. Hungenberg (2000), p. 51ff; Macharzina (1999), p. 30ff as well as in more detail Knyphausen-Aufsess (1995) and Hoskisson et al. (1999).

(1969), Ansoff (1965), Selznick (1957), as well as Penrose (1959). Scholars of this field tended to focus on opening the 'black box' of firms, i.e., looking at the firms' growth, attributive to firm internal resources. Additionally, within this period, the concept of 'best practices' was introduced into the field of strategic management, which later on became known as the process of benchmarking.[66]

In the 70s and 80s, the focus within strategic management shifted towards firm external factors and towards industrial organization (IO) economics.[67] The roots of IO economics are based on Bain (1956, 1968) and Mason (1957) who were concerned with finding answers to the question of coherences between the structure of an industrial sector and the resulting effects on firm performance within this industry.[68] The original industrial economic objective is primarily economically oriented – focusing on the analysis of optimal market structures for, e.g., achieving goals of fair distribution and optimal factor allocations, whereas the work of Bain (1956) and Porter (1984, 1989) gave special emphasis to strategic management ideas. The purpose of these contributions, which formed the basis of the so called *market-based view* (MBV), was to find an explanation for the cause of performance differences between firms within the same industrial sector. In this connection, the MBV is based on the "structure-conduct-performance"-paradigm which explains competitive advantages ("performance") through industry structure ("structure") and behavior of industry members ("conduct").[69] The main characteristic of the MBV is its outside-in perspective, i.e., success-potentials are only obtainable through focusing on firm-external factors and taking market and environmental requirements into account.[70] Porter (1984, 1989) defines firm success to be dependent on both the industry attractiveness and the relative position of the firm in this industry.[71] The attractiveness of an industry relies on the following five competitive forces: threat through new competitors or substitutes; power of suppliers and/or consumers; as well as the rival intensity of the competitors within an industry. Chances for success decrease with an increase of each of the aforementioned competitive forces. Following Porter (1984, 1989), gaining competitive advantages is only possible by applying either one of the two generic competitive strategies: cost-leadership or differentiation strategy; both can be applied to a

[66] Cf. Hoskisson et al. (1999), p. 419.
[67] Cf. Hoskisson et al. (1999), p. 419. For IO economics see Porter (1980, 1985).
[68] Cf. Bea/Haas (2001), p. 24; Hungenberg (2000), p. 54; Rühli (1994), p. 34.
[69] The "structure-conduct-performance"-paradigm results from industrial economics research in the 1940s by Mason (1957) and Bain (1956). See also Bea/Haas (2001), p. 24; Hungenberg (2000), p. 54; Rühli (1994), p. 34.
[70] Cf. Bea/Haas (2001), p. 25; Corsten (1998), p. 20; Hümmer (2001), p. 29.
[71] Cf. Porter (1984), p. 25ff and (1989), p. 19ff.

whole industry or just single segments (so-called niche-strategies).[72] To find differentiation and cost potentials, Porter uses his value-chain-concept as an analysis instrument, through which he expects an explanation of success differences of firms within the same strategic group.[73] Thus, a firm gains a sustainable and defendable competitive advantage through an appropriate market position. Empirical research confirms the relevance of market-related success factors in this connection.[74]

Yet, in spite of these valid discoveries, the MBV also gives reason for criticism. First of all, most criticism aims at the dominance of environmental factors – due to the industrial-centered perspective – for explaining firm success.[75] Critics claim to pay more regard to the individual firm with its firm-specific strengths and weaknesses as a source of success and, hence, a stronger acknowledgement of the differences between firms.[76] Accordingly, another main criticism of the MBV is its overall insinuated homogeneity of firms within one industry.[77] If that was the case, success would only be determined by the affiliation to a certain industry and, i.e., firms' performances in this industry should not vary, which can in practice be easily confuted.[78] Furthermore, just focusing on the industry attractiveness leads firms to only take established industries into account and, thus, to neglect strategies regarding emerging markets.[79] Hence, an outside-in perspective can also be interpreted as a rather innovation-inhibiting perspective, because firms tend to concentrate on the current customer needs within existing markets when it comes to the identification of strategic success potentials. Also, the disintegration of distinct industry barriers makes it difficult for firms to concentrate on the industry structures and their strategic groups. Yet, following the MBV, it is this distinct boundary classification that is necessary for choosing a favorable position within the particular industry.[80]

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[72] Cf. Porter (1984), p. 62ff and (1989), p. 31ff.
[73] Cf. Porter (1989), p. 94ff and p. 164ff; specifically for the value chain Porter (1989), p. 63ff. A group of firms within an industry, all pursuing the same or similar competitive strategies and with relative similar characteristics (i.e., sales, number of employees, etc.) are called a *strategic group*. Cf. Porter (1984), p. 177; Aaker (1989), p. 72.
[74] Cf. Rühli (1995), p. 93. The core tenets of the Market-based view are confirmed through the results of the product-life-cycle, the learning curve, and PIMS-study ("Profit Impact of Market Strategies"). Cf. Macharzina (1999), p. 265ff; Bea/Haas (2001), p. 25.
[75] Cf. Rühli (1994), p. 41; Macharzina (1999), p. 56; Hungenberg (2000), p. 55; Jenner (1998), p. 1313; Hansen/Wernerfelt (1989), p. 399ff.
[76] Cf. Macharzina (1999), p. 56; Bamberger/Wrona (1996a), p. 386.
[77] As a result from findings within industrial economics, firms would usually be looked at as a "Black box"; hence, neglected that they themselves could be a carrier of idiosyncratic resources and thus actively shape their field of competitors. Cf. Peteraf (1993), p. 11.
[78] Cf. Knaese (1996), p. 52; Cool/Schendel (1988), p. 207ff; Rossbach/Wagner (1999), p. 557f.
[79] Cf. Bea/Haas (2001), p. 25f; Börner (2000), p. 692.
[80] Cf. Prahalad/Hamel (1990), p. 81ff; Jenner (1998), p. 1315; Lührs (2001), p. 66; Barney (2001), p. 47.

Based on this criticism, firm-external factors are obviously not capable of sufficiently and solely explaining competitive advantages and performance differences between firms. Additionally, the forthcoming empirical studies hinted at the relevance of internal factors to explain a company's performance and refute the pre-dominance of external determinants that the market-based view favored: "Yet empirical investigation has failed to support the link between industry structure and profitability."[81] Consequently, at the beginning of the 1990s, there was a shift towards an inside-out perspective which put the firm itself back into the centre of attention and took, again, a closer look at firm-internal factors, i.e., resources as the source for competitive advantages.[82] This emerging theory was called *resource-based view* and is currently discussed as resource-based *theory*.[83] In the next chapter, RBT will be outlined in detail.

2.3 Resource-based Theory in Strategic Management

Since performance differences cannot be entirely explained by looking only at market-oriented influential factors, a closer look at firm-internal factors, i.e., a firm's resources, seems to be justified. Subsequently, there will be a brief historical review of the development of RBT as well as a summary of the theory's basic assumptions. The emphasis will then be placed on the definitions of RBT's central constructs.

2.3.1 Development of Resource-based Theory

Following Selznick's work (1957) on distinctive competencies[84] and Penrose's (1959) definition of the firm as a system of productive resources,[85] Wernerfelt (1984), in his pioneering article "A Resource-based View of the Firm", merges these ideas and builds a basis for our current understanding of the resource-based perspective.[86] Yet, the most theoretical influences in this connection are ascribable to Barney's 1991 paper "Firm Resources and Sustained Competitive Advantage", who's framework and definitions of the

[81] Grant (1991), p. 117.
[82] Cf. Corsten (1998), p. 16; Sanchez/Heene (1997), p. 304; Jenner (1998), p. 1312f; Bamberger/Wrona (1996a), p. 386; Rühli (1994), p. 32; Lührs (2001), p. 64f; Rasche/Wolfrum (1994), p. 502.
[83] Cf. Conner (1991), p. 122; Peteraf/Barney (2003), p. 309; Barney/Mackey (2005), p. 2.
[84] Cf. Selznick (1957), p. 42ff. Later on, the definition of *distinctive competences* becomes a central construct within the core competence perspective, which is a further development of RBT. Cf. Hümmer (2001), p. 70; Wolfsteiner (1995), p. 46.
[85] Cf. Penrose (1959), p. 24ff.
[86] Cf. Wernerfelt (1984). "Wernerfelt's argumentation is an example of dualistic reasoning common in economics. […] Wernerfelt (1984) attempted to develop a theory of competitive advantage based on the resources a firm develops or acquires to implement product market strategy as a complement or dual of Porter's (1980) theory of competitive advantage based on a firm's product market position. […] Competition among product market positions held by firms can thus also be understood as competition among resource positions held by firms." Barney/Arikan (2001), p. 131.

core constructs of RBT are widespread. Further decisive contributions come from Rumelt (1984, 1991),[87] Grant (1991), Peteraf (1993, 2003), Dierickx and Cool (1989), Mahoney and Pandian (1992), as well as Wernerfelt (1989, 1991, 1995) and Barney (1986, 2001, 2003, 2005) themselves.[88]

The field of research concerning RBT includes all models and contributions of strategic management research, which explain and conclude a firm's competitive success by the existence of its ***unique firm-specific resources***.[89] Thus, RBT aims at showing the importance of firm-specific resources in achieving sustainable competitive advantage and, hence, superior performance.[90] Therefore, firms are understood as a bundle of tangible and intangible resources, whereas these resources are uncommonly distributed among firms.[91] The latter, i.e. resource heterogeneity, is substantiated out of each firm's different historical development.[92] Amongst these resources, only a few have the potential to build the basis for sustainable competitive advantages; these resources are called ***strategic resources***.[93] Yet, achieving a competitive advantage is only possible if these strategic resources are integrated within, and transformed through, strategies to enhance the firm's efficiency and/or effectiveness and, respectively, try to generate a perceivable additional customer benefit. Accordingly, the firm has to have ***capabilities*** to realize the success potentials of these strategic resources.[94]

To sum up, RBT introduces an important new aspect into the field of strategic management: the emphasis on firm-internal resources for gaining sustainable competitive advantages and generating rents, which accentuates the uniqueness of firms. Together, these general statements create the foundation of what is known today as resource-based theory. In addition

[87] Rumelt (1984) was also one of the first to define firms as a bundle of resources and to ascribe different economic values to each resource, depending on different contexts. Furthermore, he introduced the concept of 'isolating mechanisms' regarding the imitability of these resources. Cf. Barney/Arikan (2001), p. 132.

[88] Cf. Rumelt (1984, 1991); Grant (1991); Peteraf (1993, 2003); Dierickx/Cool (1989); Mahoney/Pandian (1992); Wernerfelt (1984, 1989, 1995); Barney (1986, 1991, 2001, 2003, 2005). Also, the following authors can be regarded as representatives of RBT: Amit/Schoemaker (1993); Barney/Arikan (2001); Black/Boal (1994); Chatterjee/Wernerfelt (1991); Chi (1994); Collis (1991, 1994); Collis/Montgomery (1995); Conner (1991); Hall (1992, 1993); Hansen/Wernerfelt (1989); Knyphausen (1993); Knyphausen-Aufsess (1995); Prahalad/Hamel (1990); Rasche (1994); Rasche/Wolfrum (1994); Reed/DeFillipi (1990); Teece et al. (1997). An extensive overview of the theoretical history of RBT as well as a textual overview of the multitude of contributions regarding resource-based frameworks and definitions can both be found within Barney/Arikan (2001), p. 124ff as well as within Freiling (2001), p. 9f and p. 28ff.

[89] Cf. Rasche/Wolfrum (1994), p. 502; Welge/Al-Laham (2001), p. 252.

[90] Cf. Bamberger/Wrona (1996a), p. 386. For instance, the results within Hansen and Wernerfelt (1989) as well as Rumelt (1991) showed a significant firm-effect.

[91] Cf. Penrose (1959), p. 75.

[92] Cf. Bamberger/Wrona (1996a), p. 386 and (1996b), p. 131; Barney (1991), p. 101; Rasche (1994), p. 55; Peteraf (1993), p. 180; Knyphausen (1993), p. 776.

[93] Cf. Barney (1991), p. 101; Bamberger/Wrona (1996a), p. 386 and (1996b), p. 131f.

[94] Cf. Mahoney (1995), p. 92; Mahoney/Pandian (1992), p. 365; Penrose (1959), p. 52ff; and similarly Barney (1991), p. 102; Aaker (1989), p. 33 and p. 47f.

to RBT, there has been a multitude of parallel streams building on these resource-based ideas. For instance, two of the most important streams are the theory of invisible assets and work on competence-based theories of corporate diversification.[95] Also, there have been several different emphases regarding different kinds of resources, i.e., competencies, capabilities, dynamic capabilities, knowledge, skills, etc. As helpful as these distinctions might be for clarifying the resource definition, and showing that different resources might be of different value for the firm, it has also led to a variety of confusing 'new theory' labels, e.g., 'capability-based theory', 'knowledge-based theory', etc.[96] Yet, following Barney and Arikan (2001), these battles over the label of resource-based theoretical frameworks are of no use since the are signifying nothing.[97] In this dissertation these different concepts will all be summed up under the heading of resource-based theory, since they can all be reduced to the same resource-based roots.

2.3.2 Assumptions

RBT makes several basic assumptions within its theoretical framework. As most of the strategic management theories, RBT adopts the assumption of bounded rationality as well as the assumption that firms are seeking to maximize their profits.[98] Yet, what distinguishes RBT from other management theories are two additional assumptions: first, that resources are heterogeneously distributed among firms, i.e., the assumption of ***resource heterogeneity*** and second, that resources are immobile due to factor market inefficiencies, i.e., the assumption of ***resource immobility***.[99]

Resource heterogeneity is substantiated due to the firm-specific historical development process[100] as well as due to the inefficiency of factor markets,[101] whereas the latter in this

[95] Cf. Itami/Roehl (1987); Prahalad/Hamel (1990). For more details see Barney/Arikan (2001), p. 136 as well as Itami/Roehl (1987) and Prahalad/Hamel (1990).
[96] Cf. Barney/Arikan (2001), p. 139. Hart (1995), for instance, analyses competitive advantages while focusing on a firm's relationship to the natural environment, referring to the theory as 'a *natural*-resource-based view of the firm'. Cf. Hart (1995), p. 986. Lado and Wilson (1994), also building on resource-based knowledge, focus on HR Systems and refer to the 'competence-based perspective'. Cf. Lado/Wilson (1994), p. 699.
[97] Cf. Barney/Arikan (2001), p. 140.
[98] Cf. Barney/Arikan (2001), p. 141.
[99] Cf. Barney (1986), p. 1232 and (1991), p. 103; Amit/Schoemaker (1993), p. 33ff; Dierickx/Cool (1989), p. 1505; Peteraf (1993), p. 183f; Peteraf/Barney (2003), p. 311. The concept of resource heterogeneity implies that resources can be scarce and non-substitutable, whereas the immobility of resources implies that these resources might be inelastic in supply. Cf. Barney/Arikan (2001), p. 141.
[100] In this context, researchers often refer to the concept of firm-specific path-dependency, which implies that future strategic decisions always depend partly on the decisions made in the past. Cf. Barney (1986), p. 1235f; Black/Boal (1994), p. 132; Collis (1991), p. 51; Bamberger/Wrona (1996a), p. 386.
[101] Cf. Barney (1986), p. 1231ff; Amit/Schoemaker (1993), p. 35; Knyphausen-Aufsess (1995), p. 83.

connection refers to imperfect and non-existent factor markets.[102] In his 1986 paper, Barney introduces the concept of strategic factor markets (i.e., markets where firms acquire or develop resources they need for realizing their product market strategies) analogous to Wernerfelt's (1984) product markets. Barney argues that if there were perfect factor markets, i.e., an exact congruence of resources' prices and their to-be-expected profits, no competitive advantages could be realized with these resources.[103] Therefore, firms are only able to gain profits if the resources' costs are below their economic value, i.e., if firms exploit an imperfect factor market.[104] The latter is mainly constituted through information asymmetries which, consequentially, lead to different expectations of market participants regarding the resources' value and, thus, to heterogeneous resource-equipments of firms.[105] Following Barney (1986), there are basically two ways for markets to be imperfectly competitive and, so, two ways for firms to acquire the resources they need for implementing their strategies and gain rents: firms can either benefit from luck, due to general uncertainty about the actual value of the resources it is acquiring, or firms can benefit from having better insights about the future value of these resources.[106] Regarding the notion of non-existent factor markets, the previously implied mobility and transferability for all resources is not basically given. In reality, often there are no according factor markets for some resources, i.e., non-existent factor markets.[107] Provided that restricted transferability of resources between competitors exists, firms can therefore gain rents with such resources.[108] It is thus assumed that resources exist, which due to their firm-specific character, are not tradable. If trying to trade these resources on the market, results may be very unprofitable due to enormous obsolescence, or the lack of transferability of these resources may even hinder their being traded at all.[109] Following Lippman and Rumelt (1982), *resource mobility* in this connection can be restricted either due to the ambiguity about what resources are responsible for superior performance, hence, *which* resources should become mobile, or due to the uniqueness of a resource,

[102] Cf. Barney (1986), p. 1232; Rasche (1994), p. 55.
[103] Cf. Barney (1986), p. 1231. Following Barney and Arikan (2001), within this paper, Barney (1986) shows that "the fact that strategic factor markets can be perfectly competitive implies that theories of imperfect product market competition are not sufficient for the development of a theory of economic rents. This, of course, contradicts one of the central tenets of Porter's theory of industry attractiveness in that the ability of firms to enter and operate in attractive product markets is an explanation of persistent superior firm performance." Barney/Arikan (2001), p. 133.
[104] Cf. Barney (1986), p. 1232.
[105] Cf. Rumelt (1984), p. 561; Barney (1986), p. 1231ff; Grant (1991), p. 126; Peteraf (1993), p. 185; Rasche (1994), p. 58ff; Freiling (2001), p. 85ff.
[106] Cf. Barney (1986), p. 1232; Barney/Arikan (2001), p. 133.
[107] Cf. Dierickx/Cool (1989), p. 1505f; Rasche (1994), p. 63ff.
[108] Cf. Barney (1991), p. 105; Chi (1994), p. 273; Mahoney/Pandian (1992), p. 364.
[109] Cf. Dierickx/Cool (1989), p. 1505f; Barney (1991), p. 103ff; Knyphausen-Aufsess (1995), p. 83f; Peteraf (1993), p. 183f; Black/Boal (1994), p. 135; Chi (1994), p. 273f.

combined with enforceable rights to the exclusive use of this unique resource, such as patents.[110]

Important to acknowledge is that these two assumptions suggest that resource heterogeneity and immobility *may* exist, yet, not all firms will possess resources that are strategically relevant. Only some firms possess resources that enable them to more effectively develop and implement strategies compared to other firms, and when these resource differences last, one can gain sustainable competitive advantages.[111]

2.3.3 Central Constructs

Even though there is common agreement on the main assumptions of RBT, as previously outlined, a variety of definitions leads to a dispute among researchers.[112] This dispute results from the wide range of contributions from many different authors.[113] Furthermore, some differences can be denoted regarding the framework of RBT: in general, theoretical resource-based frameworks within the literature agree on the link between firm ***resources*** as a source for superior firm ***performance***, while looking at conditions of ***factor markets*** to substantiate the assumption of resources being heterogeneously distributed among firms. Yet, these frameworks differ to some extent regarding the ex post and ex ante limitations to competition behind these coherences, as well as to what RBT can be used to predict, i.e., the dependent variable.[114] In other words, different conditions of each of these constructs (resources, performance, and markets) are argued to be of importance.

Next, I want to follow Priem and Butler's (2001b) request that RBT needs to work more on its definitions of constructs before strong empirical tests are possible.[115] Thus, each of these constructs and their conditions will be briefly defined, given that they constitute the central propositions of RBT. Here, I will especially focus on ten of the most relevant publications within RBT: seven core RBT papers, i.e., Wernerfelt (1984), Barney (1986, 1991), Dierickx and Cool (1989), Grant (1991), Mahoney and Pandian (1992), and Peteraf (1993); two additional papers addressing the criticism regarding RBT, i.e., Barney's (2001) discussion with Priem and Butler (2001) and Peteraf and Barney's (2003) discussion with Foss and

[110] Cf. Lippmann/Rumelt (1982), p. 420. Moreover, Lippmann and Rumelt emphasize that "…the concepts of uncertainty and functional uniqueness (as opposed to purely nominal distinctiveness) are deeply interdependent; in the absence of uncertainty, the creation of a unique resource could be repeated and its uniqueness destroyed." Lippman & Rumelt (1982), p. 420. Also, see Peteraf (1993), p. 184.
[111] Cf. Barney/Arikan (2001), p. 141.
[112] Cf. Peteraf (1993), p. 180; Barney/Arikan (2001), p. 140.
[113] Cf. Bamberger/Wrona (1996b), p. 132; Freiling (2001), p. 9.
[114] Cf. Peteraf/Barney (2003), p. 310.
[115] Cf. Priem/Butler (2001), p. 62.

Knudsen (2003); and one additional contribution conducting an overview of RBT, i.e., Barney and Arikan (2001).[116]

2.3.3.1 The First Central Construct: Resources

Regarding the first central construct of RBT, a ***resource*** within this theory is defined in numerous ways.[117] First, a rather limited and an extended definition can be distinguished in the literature: on view considers only firm-specific assets that are under full control of the firm as resources,[118] whereas most of the authors regard all firm-specific assets, systems, processes, and capabilities that determine the firm's strengths and weaknesses and are at least temporarily tied to the firm as resources.[119] Additionally, some authors distinguish between resources and capabilities, where resources are able to bear the potential for success, and capabilities are necessary to transform this potential into success.[120] Apparently, the extended resource definition does not generally include this differentiation, and regards a firm's capabilities to transfer resource potentials as resources.[121] Mahoney (1995), for instance, argues that the key to managing resources is the resource of management,[122] whereas Makadok (2001) defines capabilities as specific resource types that are organizationally embedded and nontransferable and serve the purpose to improve the productivity of the *other* resources of the firm.[123] So, in this dissertation, I argue to rely on an extended resource definition because it does not constrain the meaning of resources, and hence, from an empirical perspective, avoids ignoring significant resources: "Rather than limit its prescriptions to specific resources that can be identified, a priori, managers can apply resource-based logic to any resource whose value can be determined from the market context within which the resource is to be applied".[124] Therefore, this dissertation *defines resources* as

[116] These publications are relevant in terms of their impact on resource-based work in general as can be seen through their citation impact factors.
[117] So far, a generally accepted resource definition does not exist. An overview of the diversity of definitions can be found in Freiling (2001), p. 14. De Carolis (2003) provides an overview of definitions relating to competencies in the management literature, i.e., outlines definitions regarding 'resources', 'strategic assets', 'competencies', 'core competencies', 'capabilities', 'core capabilities'. Cf. De Carolis (2003), p. 30f.
[118] Cf. Amit/Schoemaker (1993), p. 35; Teece et al. (1997), p. 516; Priem/Butler (2001a), p. 24.
[119] Cf. Wernerfelt (1984), p. 172; Barney (1991), p. 101 and (2001), p. 54; Grant (1991), p. 119; Mahoney/Pandian (1992), p. 364f; Barney/Arikan (2001), p. 138.
[120] Cf. Grant (1991), p. 119; Amit/Schoemaker (1993), p. 35.
[121] Cf. Barney (1991), p. 102 and (2001), p. 50f; Mahoney/Pandian (1992), p. 365; Barney/Arikan (2001), p. 139; Peteraf/Barney (2003), p. 316; Penrose (1959), p. 52ff; Aaker (1989), p. 33 and p. 47f; Mahoney (1995), p. 92.
[122] Cf. Mahoney (1995), p. 92.
[123] Cf. Makadok (2001), p. 389.
[124] Barney (2001), p. 51. See also Mahoney (1995), p. 91.

the tangible and intangible assets which are tied semi-permanently to the firm and are being used by the firm to choose and implement its strategies.[125]

As regards to ***resource categorizations***, the literature generally distinguishes between two *resource-types*, i.e., *tangible* vs. *intangible* resources, each with different *categories*.[126] In trying to allocate a firm's resources to either one of these two types, it is important to acknowledge that this is not a rigid categorization and that those categories can overlap. Rather tangible resources are for instance a firm's financial capital (e.g., equity capital, debt capital, retained earnings) and physical capital (e.g., the machines and buildings it owns), whereas rather intangible resources are for example a firm's human capital (training, experience, relationships, and insights of managers and other employees) and organizational capital (e.g., a firm's culture, its reputation, networks, etc.).[127] Generally, intangible resources are of greater interest to RBT: The value of intangible resources enhances if they are being employed (i.e., they gain strategic relevance), e.g., employees' expertise and knowledge. Furthermore, unlike tangible resources, intangibles are not limited in capacity, i.e., they do not wear out.[128]

Regarding ***intangible resources***, Hall (1992, 1993) further distinguishes between people-independent *intangible firm assets*, such as patents, licenses, or reputation on the one hand, and people-dependent *skills* such as specific know-how, capabilities, or expertise on the other hand. The latter can be further differentiated into *static* and *dynamic capabilities*, whereas static capabilities are less flexible and rather specialized compared to dynamic capabilities, which tend to be very flexible and easily adaptable to changing environments.[129] Additionally, dynamic capabilities can be divided into sub-categories according to their codifiability and implicitness, e.g., tacit knowledge vs. explicit and articulated knowledge.[130] Another intangible sub-category can be called *routines*, which are organizationally embedded and define regular and predictable patterns of activity based on a sequence of coordinated actions

[125] Cf. Barney (2001), p. 54; Wernerfelt (1984), p. 172. 'Semipermanently' in this connection refers to resources which are at least temporarily bound to the firm, i.e., this definition also includes resources such as (expireable) patents, human resources (only bound by their contracts), etc. For instance, Grant (1991) pointed out that there is only limited control with human resources through employment contracts and thus it is rather risky for a firm's strategy to be dependent upon specific key employees and their skills. Cf. Grant (1991), p. 128.
[126] Cf. Black/Boal (1994), p. 134; Barney (1991), p. 101f; Chatterjee/Wernerfelt (1991), p. 35; Grant (1991), p. 119; Collis/Montgomery (1995), p. 119f.
[127] Cf. Barney/Arikan (2001), p. 139.
[128] Cf. Chatterjee/Wernerfelt (1991), p. 35; Penrose (1959), p. 24 and p. 54; Prahalad/Hamel (1990), p. 82; Rasche (1994), p. 41; Hall (1992), p. 136ff and (1993), p. 608ff; and also Itami/Roehl (1987). Itami and Roehl (1987) argue that intangible resources (primary information-based resources) have the biggest impact regarding sustainable competitive advantages. Cf. Itami/Roehl (1987), p. 12f.
[129] Cf. Hall (1992), p. 136ff and (1993), p. 608ff; Rasche (1994), p. 95; Knaese (1996), p. 16.
[130] Cf. Spender (1993), p. 37ff; Nelson/Winter (1982), p. 76ff.

by employees.[131] Teece and Pisano (1994) distinguish between *static* and *dynamic routines*; the former refer to rather specialized standard operation procedures, such as specific production processes, whereas the latter are rather flexible and, again, easily adaptable to changing environments.[132] In the literature, dynamic routines are also referred to as dynamic organizational capabilities, focusing on research of a firm's organizational knowledge and learn ability, i.e., a rather dynamic approach of RBT.[133] Looking at the constantly changing environment, dynamic capabilities – both organizational and people-dependent – become more and more important for they represent capabilities which reflect a firm's ability to gain new and innovative possibilities for creating competitive advantages. In this connection, Teece et al. (1997) define dynamic capabilities as "…the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments."[134]

To sum up, Figure 2 gives an overview of a proposed ***resource categorization scheme*** as well as examples on this subject:[135]

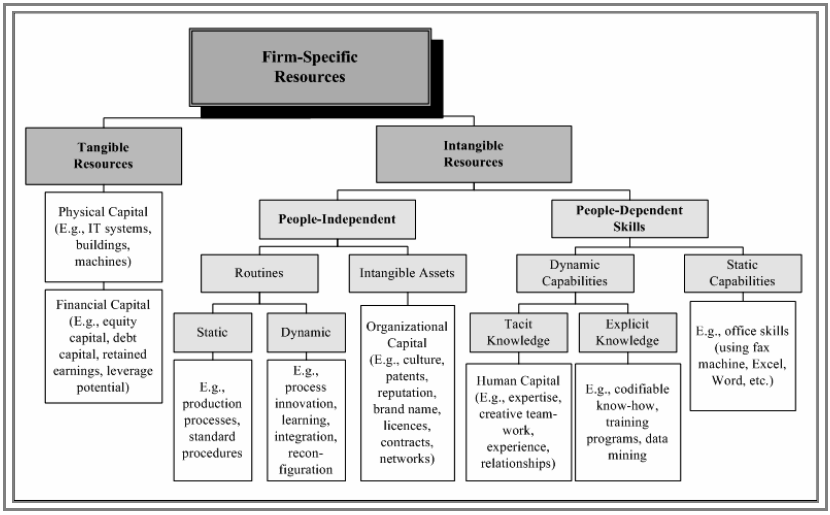


Figure 2: Resource Categorization Scheme within RBT

[131] Cf. Grant (1991), p. 122.
[132] Cf. Teece/Pisano (1994), p. 537f.
[133] Cf. Teece/Pisano (1994); Teece et al. (1997); Eisenhardt/Martin (2000); Helfat/Peteraf (2003).
[134] Teece et al. (1997), p. 516. Furthermore, Eisenhardt and Martin (2000) argue that since the functionality of dynamic capabilities can be duplicated across firms (e.g., best practice), their value for competitive advantage lies in the resource configurations that they create, not in the capabilities themselves. Thus, dynamic capabilities are necessary but not sufficient conditions for competitive advantages. Cf. Eisenhardt/Martin (2000), p. 1106f.
[135] This categorization is based on Hümmer (2001), p. 55; further examples are taken from Hall (1992), p. 136f; Collis/Montgomery (1995), p. 119f; Mahoney (1995), p. 94. This systematic categorization is, of course, neither restrictive nor static. Instead, in reality most of these categories are overlapping.

There is one additional resource type, i.e., *core competency*, which has received a great deal of attention but does not appear within this categorization scheme. Core competencies do not represent an additional resource category but can be seen rather as diverse resource bundles, i.e., aggregated resources which can embody a core competency. Prahalad and Hamel (1990) defined a corporation's core competence in this connection as an organization's collective learning, focusing on how to coordinate and integrate different production skills and different technologies.[136]

Next, regarding the ***resources' conditions***, the indicators that are discussed within RBT literature to reveal the resource's potential to contribute to a firm's performance,[137] will be reviewed and merged, i.e., a resource has to be attractive,[138] valuable,[139] scarce,[140] rare,[141] unique,[142] immobile,[143] non-tradable,[144] non-transferable,[145] non- or imperfectly imitable,[146] imperfectly transparent,[147] imperfectly replicable,[148] and non-substitutable.[149]

Regarding the first condition, i.e., ***value***, the first two indicators – attractiveness and value – can be combined, for they have the same connotation: the authors generally argue that a resource is *valuable* when it enables the generation of significant benefits for the customer, or when it enhances efficiency and/or effectiveness.[150] Most criticism concerning the empirical testability of the theory stems from the interpretation of value. As Peteraf and Barney (2003) assess: "…resources are often defined in terms of the performance outcomes associated with them. This criticism is well taken, for if resources are defined as rent-producing assets and

[136] Cf. Prahalad/Hamel (1990), p. 82.
[137] In the literature, these resources are also referred to as *strategic resources*. Cf. Barney (1991); Amit/Schoemaker (1993); Grant (1991); Peteraf (1993); Reed/DeFillippi (1990); Mahoney (1995).
[138] Cf. Wernerfelt (1984), p. 174.
[139] Cf. Barney (1991), p. 106 and (2001), p. 42; Mahoney/Pandian (1992), p. 364; Barney/Arikan (2001), p. 138; Peteraf/Barney (2003), p. 316.
[140] Cf. Wernerfelt (1984), p. 174; Peteraf (1993), p. 180; Barney/Arikan (2001), p. 139; Peteraf/Barney (2003), p. 316.
[141] Cf. Barney (1991) p. 106 and (2001), p. 44; Mahoney/Pandian (1992), p. 364.
[142] Cf. Barney (1986), p. 1236; Peteraf/Barney (2003), p. 316.
[143] Cf. Barney (1991), p. 103; Peteraf (1993), p. 183; Barney/Arikan (2001), p. 141.
[144] Cf. Dierickx/Cool (1989), p. 1507; Peteraf (1993), p. 183.
[145] Cf. Grant (1991), p. 126; Peteraf (1993), p. 183.
[146] Cf. Dierickx/Cool (1989), p. 1507; Barney (1991), p. 107 and (2001), p. 45; Mahoney/Pandian (1992), p. 364; Peteraf (1993), p. 182.
[147] Cf. Grant (1991), p. 125.
[148] Cf. Grant (1991), p. 128.
[149] Cf. Wernerfelt (1984), p. 173; Dierickx/Cool (1989), p. 1507; Barney (1991), p. 107 and (2001), p. 47; Mahoney/Pandian (1992), p. 364; Peteraf (1993), p. 182; Barney/Arikan (2001), p. 141. Additionally, Grant (1991) focuses on the durability of resources, i.e., the rate at which resources depreciate or become obsolete. Yet, within each of the following conditions durability plays an important role in several ways and, thus, will be discussed there. Cf. Grant (1991), p. 124.
[150] Cf. Wernerfelt (1984), p. 174; Barney (1991), p. 106 and (2001), p. 42; Mahoney/Pandian (1992), p. 364; Barney/Arikan (2001), p. 138; Peteraf/Barney (2003), p. 316.

capabilities, then we cannot hope to falsify the prediction that rents stem from such resources."[151] This criticism is known as the tautology problem within RBT. Yet, here, value is defined in terms of a resource's impact on the costs (reducing) and/or benefits (enhancing) associated with a firm's product. Even though such resources affect the firm's performance through its products, this effect is not direct nor deterministic because there may be resources which are enhancing benefit for the firm but are at the same time very costly to employ and thus will not generate much value overall.[152] This definition of valuable resources therefore confutes the tautology claim.[153]

Regarding the second condition, i.e., ***rareness***, it encompasses the indicators referring to rare, scarce, and unique resources, as well as indicators dealing with the immobility of resources. Basically, scholars state that without rareness, competitors would be able to implement the same strategy with these resources.[154] A resource is argued to be *rare* as long as the limited availability of resources exists and the prevention of perfect competition through a permanent surplus of demand is guaranteed.[155] Scarcity in this connection is simply a synonym for rareness, whereas a resource's uniqueness mainly refers to new resources, which are more likely to be rare and where the durability of their rareness depends upon their diffusion rate.[156] As to resource's immobility, it implies a quasi-fixed supply and that these resources are more likely to be rare since their availability is limited.[157] Resources are considered to be immobile if they are non-tradable or non-transferable (i.e., two additional indicators mentioned above). The former is argued due to the absence of well-defined property rights or "bookkeeping feasibility" problems,[158] while the latter refers to imperfections in transferability due to

[151] Peteraf/Barney (2003), p. 320.
[152] Cf. Peteraf/Barney (2003), p. 320. In choosing to include these types of resources, managers have the possibility to identify those resources as potential value creators and improve them to release their full potential. Cf. Peteraf/Barney (2003), p. 320.
[153] This criticism will be resumed and discussed in more detail within chapter 2.5.
[154] Cf. Barney (1991), p. 106. Also, see Amit/Schoemaker (1993), p. 36. "Resource scarcity alone is not sufficient to produce rents […] resources may be scarce without creating any value at all. […] On the other hand, resources may be valuable without being scarce. […] But competitive advantage requires creating not just value per se, but *more* value than the marginal competitor. This is where scarcity or rareness comes in. Only if a firm has access to value-generating resources that are *uncommonly employed* can it expect to produce the kind of value differential upon which competitive advantage depends." Peteraf/Barney (2003), p. 318 (emphasis in the original).
[155] Cf. Wernerfelt (1984), p. 174; Barney (1991), p. 107 and (2001), p. 44; Mahoney/Pandian (1992), p. 364; Peteraf (1993), p. 180; Barney/Arikan (2001), p. 139; Peteraf/Barney (2003), p. 316.
[156] Cf. Barney (1986), p. 1236; Peteraf/Barney (2003), p. 318.
[157] Cf. Peteraf (1993), p. 183. Also, see Freiling (2001), p. 110.
[158] Cf. Dierickx/Cool (1989), p. 1507; Peteraf (1993), p. 183.

geographical immobility, idiosyncrasy, social complexity, causal ambiguity, or enormous obsolescence.[159]

Within the third condition, i.e., ***inimitability***, the indicators of non- or imperfect imitability, imperfect transparency, and imperfect replication all relate to the same barriers of imitation, and argue that in order to gain a sustainable competitive advantage, strategic resources must be inimitable to prevent competitors from imitating the same strategy.[160] A resource is considered to be *inimitable* if one or more of the following three imitation barriers[161] apply for this resource: (1) social complexity,[162] which Dierickx and Cool (1989) term interconnectedness of assets,[163] and Grant (1991) refers to as being imperfectly replicable due to complexity;[164] (2) causal ambiguity,[165] which Grant (1991) denotes as imperfect transparency;[166] and (3) firm-specific historical development,[167] which also includes Dierickx and Cool's (1989) argumentation of time compression diseconomies and asset mass efficiencies.[168] Since competitive advantages are normally constituted by several resources, social complexity occurs due to the interdependencies of these resources. Additionally, resources can also be socially complex themselves if they consist of multiple tangible and intangible factors.[169] Causal ambiguity occurs, similar to social complexity, due to the interconnectedness of resources, yet, with the difference that the firm itself is not able to identify the relevant resources, i.e., ambiguity among decision-makers about the link between resources and performance.[170] Firm-specific historical development implies that each firm has its unique historical background resulting in idiosyncratic resource endowments, because previous decisions and events are inimitable and not reproducible.[171] These mechanisms can be interdependent and impede imitation, either independently or in combination. Recalling

[159] Cf. Grant (1991), p. 126; Barney (1991), p. 103; Peteraf (1993), p. 183; Barney/Arikan (2001), p. 141.
[160] Cf. Barney (1991), p. 107; Amit/Schoemaker (1993), p. 39.
[161] Rumelt (1984) was the first to introduce the concept of imitation barriers which he termed 'isolating mechanisms'. These mechanisms included property rights to scarce resources, various quasi-rights in form of lags, information asymmetries, and frictions which impede imitation. Cf. Rumelt (1984), p. 568.
[162] Cf. Barney (1991), p. 107 and (2001), p. 45; Mahoney/Pandian (1992), p. 372.
[163] Cf. Dierickx/Cool (1989), p. 1507f.
[164] Cf. Grant (1991), p. 128.
[165] Cf. Barney (1991), p. 107 and (2001), p. 45; Mahoney/Pandian (1992), p. 371; Peteraf (1993), p. 183. And similarly Lippmann and Rumelt (1982): "In summary, uncertain imitability obtains when the creation of new production functions is inherently uncertain and when either causal ambiguity or property rights in unique resources impede imitation and factor mobility." Lippman/Rumelt (1982), p. 421.
[166] Cf. Grant (1991), p. 125.
[167] Cf. Barney (1991), p. 107 and (2001), p. 45; Mahoney/Pandian (1992), p. 364.
[168] Cf. Dierickx/Cool (1989), p. 1507f.
[169] Cf. Barney (1991), p. 110f; Black/Boal (1994), p. 134; Chi (1994), p. 276.
[170] Cf. Barney (1991), p. 109; Peteraf (1993), p. 182f; King/Zeithaml (2001), p. 79.
[171] Cf. Barney (1991), p. 107f.

that these barriers have also been argued to enhance a resource's immobility, inimitable resources will most likely be immobile and vice versa.[172]

Regarding the fourth condition, i.e., ***non-substitutability,*** scholars regard resources to be *substitutable* if there are opportunities to replace them by either very similar resources, or by completely different resources which bear the same potential, e.g. strategic equivalents.[173] Researchers often argue that in most cases, substitution fails due to the same imitation barriers argued above, i.e., if resources are inimitable they are likely to be non-substitutable as well.[174] Yet, this only addresses substitution approaches regarding very similar resources and tends to neglect the possibility of choosing totally different resources for substitution. Therefore, following Barney (2001), looking at substitutability is necessary to address the problem of equifinality (i.e., the ability of a system (firm) to achieve the same goals (strategies) through different routes (resources)): "Thus, substitutability deals with ambiguities that may be introduced into empirical assertions derived from the RBV because of the problem of equifinality."[175]

In addition to these construct conditions, Mannor and Shamsie (2005) point out that there are ***three different perspectives*** of resources contributing to performance:[176] First of all, the *stand-alone resource perspective*, focusing on key stand-alone resources that contribute to competitive advantage and rent generation. Here, the key to achieving competitive advantage is gaining property rights to specific resources that are rare, valuable, inimitable, and non-substitutable.[177] Second, the *resource combination perspective,* focusing on factors that build and influence resource combinations and cohesiveness for advantage. Here, the key to achieving competitive advantage is to understand the factors that allow resources to grow together and learn to work together efficiently, creating resource combinations that are rare, valuable, inimitable, and non-substitutable.[178] Third, the *resource management perspective* focuses on the management of resources to achieve competitive advantage. Here, the key to achieving competitive advantage is providing consistent and valuable management to key

[172] Cf. Lippman/Rumelt (1982), p. 421f; Peteraf (1993), p. 180ff.
[173] Cf. Wernerfelt (1984), p. 173; Dierickx/Cool (1989), p. 1507; Barney (1991), p. 111 and (2001), p. 47; Mahoney/Pandian (1992), p. 364; Peteraf (1993), p. 182; Barney/Arikan (2001), p. 141.
[174] Cf. Rasche/Wolfrum (1994), p. 506.
[175] Barney (2001), p. 47.
[176] Cf. Mannor/Shamsie (2005).
[177] E.g., Penrose (1959); Wernerfelt (1984); Peteraf (1993).
[178] E.g., Black/Boal (1994); Brush/Artz (1999); Galunic/Rodan (1998). Regarding for example tacit skills, Ambrosini and Bowman (2001) assert that "clearly, one cannot establish a unique and direct link between tacit skills and competitive advantage. There is not a single factor that causes performance; tacit skills may be just one of many." Ambrosini/Bowman (2001), p. 825.

resources, reducing resource disruptions and knowing how to manage them effectively.[179] Distinguishing between these perspectives is important, especially when drawing implications from RBT; yet, regarding the underlying theoretical assumptions, all three perspectives are ultimately subjected to the same mechanisms.

Recapitulating the argumentation in the literature concerning ***resources*** as the first central construct of RBT, this dissertation adopts an extended resource definition as outlined above and *defines strategic resources* as resources that are simultaneously valuable, rare, inimitable, and non-substitutable.

2.3.3.2 The Second Central Construct: Performance

Regarding ***performance*** as the second central construct, RBT sets out to explain sustainable performance differences among firms through differences in firms' resource endowments, where superior performance is understood in terms of achieving sustainable competitive advantages and sustainable rents. Thus, RBT can be seen as being both a theory of sustainable competitive advantage as well as a theory of rents.[180] Regarding the recent debate between Peteraf and Barney (2003) and Foss and Knudsen (2003) on increasing the analytic precision of RBT, Foss and Knudsen argue that RBT's dependent variable (i.e., its explanandum) is not clearly defined, that key RBT papers discuss different dependent variables, and that a clear choice has to be made with respect to what RBT tries to explain.[181] Subsequently, the different definitions of competitive advantage and rents within RBT will be briefly outlined and reasons for relying on rents as the eventually dependent variable will be provided.

Scholars focusing on ***competitive advantage*** within RBT define this construct as 'unique product market strategies'[182] or 'creating more economic value than the marginal competitor in the product market'.[183] Note that competitive advantage within the RBT is *not* defined in performance terms such as superior financial performance. Instead, authors are looking at value creation, which allows for a conceptual separation between the differential value creation due to resources, and its distribution (appropriation). Otherwise, the causes of

[179] E.g., Castanias/Helfat (1991, 2001); Majumdar (1998); Finkelstein/Hambrick (1996).
[180] Cf. Barney/Arikan (2001), p. 140; Peteraf/Barney (2003), p. 313.
[181] Cf. Foss/Knudsen (2003), p. 292.
[182] Cf. Barney (1991), p. 102 and (2001), p. 47.
[183] Cf. Peteraf/Barney (2003), p. 314. "This definition is consistent in spirit with the definition of competitive advantage provided by Barney (1986, 1991) and with the usage of this term by Porter (1985). It is consistent, as well, with the value-based approach to competitive advantage presented in Peteraf (2001)." Peteraf/Barney (2003), p. 314.

competitive advantage could not be distinguished from the effects.[184] Value creation in this connection refers to differences between perceived customer benefits (i.e., their willingness-to-pay) and economic costs. Furthermore, this interpretation of competitive advantage characterizes RBT as an efficiency-oriented and firm-level theory rather than a theory of market power and other levels of analysis, such as strategic group levels or industry-levels.[185] Because competitive advantage is gained with firm-specific resources that are 'more efficient' (i.e., those resources that are able to enhance efficiency/effectiveness and/or better satisfy customer needs), differences in firm performance indicate rent differentials that are attributable to resources with different levels of efficiency.[186] This dissertation therefore *defines competitive advantage* as the firm's ability to create more economic value than the marginal competitor in the product market.

Scholars focusing on ***rents*** within RBT define this construct in terms of 'above normal returns',[187] 'generating higher returns than expected by stockholders',[188] or 'returns to a factor in excess of its opportunity costs'.[189] Rents in this connection can be seen as the residual value, i.e., the remainder after allocating the consumer's share of the total value. Thus, a positive differential in residual value represents the competitive advantage and equals the economic rents.[190] Specifically, authors distinguish between *entrepreneurial (Schumpeterian)* rents, i.e., short-lived rents achieved by taking risks, or entrepreneurial insights in an uncertain/complex environment;[191] *Ricardian* rents, i.e., long-lasting rents attributable to superior and scarce resources with inelastic supply curves that remain limited because they cannot be expanded freely, or imitated by other firms, i.e., fixed or quasi-fixed resources;[192] *monopoly* rents, i.e., long-lasting rents attributable to a deliberate output restriction (e.g., government protection or collusive arrangements, both implying entry barriers) instead of an

[184] As Peteraf and Barney (2003) point out, such a definition of sustainable competitive advantage "allows for a greater separation between the notion of competitive advantage and outcome variables of interest, such as rents and intra-industry performance differentials." Peteraf/Barney (2003), p. 310.
[185] As Peteraf and Barney's (2003) assert, "…RBT holds constant the contributions of other levels of analysis toward understanding profitability. It employs the ceteris paribus assumption regarding these other effects." Peteraf/Barney (2003), p. 319.
[186] Cf. Peteraf/Barney (2003), p. 311.
[187] Cf. Barney (1986), p. 1233.
[188] Cf. Barney (2001), p. 47.
[189] Cf. Mahoney/Pandian (1992), p. 364; Peteraf/Barney (2003), p. 315.
[190] Cf. Peteraf/Barney (2003), p. 315f. "How this excess residual value is divided among the firm and other claimants requires further analysis." Peteraf/Barney (2003), p. 316.
[191] Cf. Mahoney/Pandian (1992), p. 364. As the authors outline, such rents are inherently self-destructive due to knowledge diffusion; they become Ricardian rents if they cannot be imitated.
[192] Cf. Mahoney/Pandian (1992), p. 364; Peteraf (1993), p. 181; Barney/Arikan (2001), p. 140.

inherent scarcity of resources supply;[193] and *Pareto* rents (quasi-rents, or A-Q rents), i.e., rents expressing the opportunity costs in terms of the value of resources to its value in its next best use.[194] Overall, RBT-logic applies to the case of Schumpeterian, Ricardian, and monopoly rents.[195] Yet, it does not apply to Pareto rents, for their presence is not a sufficient indicator of competitive advantage: "Resources need not be rare or inimitable for them to be differentially valuable to possible users."[196] Accordingly, this dissertation *defines rents* as differences in firm performance (i.e., higher returns) that are attributable to resources with different levels of efficiency.

Barney and Arikan (2001) state that, so far, resource-based work concentrates on both, i.e., on a theory of competitive advantage and rents and, that both types of work are important in developing a comprehensive resource-based theory of sustainable superior firm performance. Yet, the authors also assess that "…a firm may enjoy a competitive advantage by being one of a small number of firms implementing a particular product market strategy, but not earn an economic rent, because the price paid to acquire or develop the resources needed to implement this strategy fully anticipates its value in the product market."[197] Therefore, in aiming to capture overall superior performance outcomes, rents seem to be the more suitable dependent variable: "One seeks an advantage in order to profit from it."[198] Additionally, Peteraf and Barney (2003) constitute that, "the extent of a firm's competitive advantage, in our terms, is an indicator of the firm's *potential* to best its rivals in terms of rents, profitability, market share, and other outcomes of interest. It is not an outcome itself and should not be thought of the 'dependent variable' […] Rather it reflects the initial positions of market participants and provides a critical litmus test for whether a resource-based outcome advantage is at all possible."[199] In other words, the chain of logic goes from resources to

[193] Cf. Mahoney/Pandian (1992), p. 364; Peteraf (1993), p. 182. Furthermore, Peteraf (1993) outlines that these are models of market power: "In monopoly models, heterogeneity may result from spatial competition or product differentiation. It may reflect uniqueness and localized monopoly. It may be due to the presence of intra-industry mobility barriers which differentiate groups of firms from one another. […] It may entail size advantages and irreversible commitments or other first mover advantages. […] These are models of market power. Unlike Ricardian models, many are 'strategic' in that firms take into account the behavior and relative position of their rivals." Peteraf (1993), p. 182.

[194] Cf. Mahoney/Pandian (1992), p. 364; Peteraf (1993), p. 184. Note that within the literature a quasi-fixed resource that yields rents is sometimes referred to as a 'quasi-rent', meaning 'quasi-Ricardian rent'. Here, quasi-rents refer to Pareto rents as outlined above.

[195] Cf. Mahoney/Pandian (1992), p. 364; Peteraf (1993), p. 184; Peteraf/Barney (2003), p. 318.

[196] Peteraf (1993), p. 184.

[197] Barney/Arikan (2001), p. 135. See also Foss/Knudsen (2003), p. 296.

[198] Foss/Knudsen (2003), p. 296.

[199] Peteraf/Barney (2003), p. 313 (emphasis in the original).

competitive advantages to rents, henceforth, within this dissertation I will focus on *rents* while looking at the dependent variable within the propositions.[200]

Regarding ***rent conditions***, as outlined within the definitions of rents, RBT argues short-lasting (i.e., *temporary*) and long-lasting (i.e., *persistent*) rents. In general, rents attributable to a resource are always a product of scarcity and their duration is determined through the resource's principle imitability: whereas with the former, i.e., with temporary rents, scarcity is a temporary phenomenon, with the latter, i.e., with persistent rents, scarcity is long-lasting either due to fixity of resource supply or due to quasi-fixed resources, i.e., through the resource's imitation barriers.[201] Here, the fixity of resource supply refers to the resource's supply inelasticity, which will be addressed subsequently while discussing market conditions; the resource's imitation barriers refer to resource conditions as discussed above.

Thus, regarding the argumentation in the literature concerning ***performance*** as the second central construct of RBT, I will focus on *rents* as the eventual dependent variable and look at two different outcomes of rents: *temporary* and *persistent rents*.

2.3.3.3 The Third Central Construct: Markets

Regarding ***markets*** as the third central construct within RBT, the theory concentrates on resource factor market conditions to constitute the heterogeneity assumption and from it explains ex ante and ex post limitations to competition.

In general, markets are imperfect since they face different kinds of distortions, i.e., supply inelasticity (incomplete markets due to imperfect factor mobility), information asymmetries (differences in competitors' market knowledge due to environmental uncertainty), and entry- and/or exit barriers (structural or strategic barriers[202]).[203] Within ***factor markets***, RBT basically argues two different distortions as necessary assumptions for gaining rents: imperfect factor-markets due to (1) *supply inelasticity* as a result of fixed and quasi-fixed resources, the latter based on resource immobility as argued above (i.e., due to resource non-

[200] Peteraf and Barney (2003) outline the chain of logic from resources to rent, i.e., superior critical resources enable lower costs and/or higher benefits and thus generate greater value (net benefits) which constitutes a competitive advantage; if there is more residual value generated for the same delivered value than rents are gained. Cf. Peteraf/Barney (2003), p. 316 and Figure 3 within chapter 2.4.1.

[201] Cf. Mahoney/Pandian (1992), p. 364; Peteraf/Barney (2003), p. 318f.

[202] Structural entry barriers result from incumbent firms' cost or marketing advantages, e.g., through control of important resources, economies of scale and scope, or marketing advantages of incumbency; strategic entry barriers result when incumbents aggressively deter entry, e.g., through limit pricing, predatory pricing, or capacity expansion. Cf. Besanko et al. (2003), p. 301. Exit barriers arise through obligations that firms must meet, e.g., labor agreements, commitments to purchase raw materials, government restrictions, etc. Cf. Besanko et al. (2003), p. 310.

[203] Cf. Lippman/Rumelt (1982), p. 418ff; Barney (1986), p. 1231; Yao (1988), p. 61; Besanko et al. (2003), p. 301ff.

transferability or non-/imperfect tradability),[204] both leading to resource heterogeneity; and imperfect factor markets due to (2) *information asymmetries* which can lead to different expectations of a resource's value and, hence, to resource heterogeneity as well.[205]

Supply inelasticity is substantiated through a resource's limited availability as well as its inimitability characteristics since such resources tend to be very firm-specific intertwined, socially complex or based on relationships which are causally ambiguous.[206] Thus, a resource being rare and inimitable seems to be extremely connected with its factor market's supply inelasticity, and the question arises whether these conditions can be differentiated. Put differently, if a resource is rare and inimitable is it not automatically inelastic in supply and vice versa?

In answer to this question, supply inelasticity needs to be further specified. First of all, supply inelasticity is primarily a question of time, with short-term supply being rather inelastic and long-term supply being rather elastic. However, some resources can be permanently inelastic in supply due to being fixed or quasi-fixed. They refer to resources where supply is not at all expandable or not expanded on purpose, which is the definition of supply inelasticity within this dissertation. In reference to the different rents models outlined above, resources, which are fixed or quasi-fixed due to an *inherent inelasticity of resources supply*, will, therefore, result in Ricardian rents, whereas resources that show an *artificial inelasticity of resources supply*, such as government protection or collusive arrangements, will result in monopoly rents. The necessary and sufficient condition for supply inelasticity is thereby resources' limited availability in terms of actual fixed supply. Now, regarding the rareness of a resource, the subtle, yet significant distinction is that a resource's limited availability is only a necessary condition; the sufficient condition for arguing rareness is that the demand for this resource always has to exceed its supply. This can be best explained by giving resource examples.

For instance, within the soccer sports industry, top sport games such as games within the 1st German Soccer League are very valuable both for the respective soccer clubs as well as for

[204] For example resources that are specialized to firm-specific needs, resources which produce high switching costs, resources which are co-specialized assets (i.e., assets which have to be used in conjunction with one another or with higher economic value if employed together), resources which produce high transaction costs if transferred. Cf. Peteraf (1993), p. 183f.

[205] Cf. Barney (1986), p. 1233, (1991), p. 103 and (2001), p. 54; Peteraf (1993), p. 181ff; Peteraf/Barney (2003), p. 316.

[206] Cf. Peteraf (1993), p. 183; Barney/Arikan (2001), p. 145. Note that rare resources cannot be equated with supply inelasticity: Resources are considered to be rare as long as their demand exceeds their supply, which generally also allows supply to be expandable. In turn, supply inelasticity does not automatically imply rare resources; basically, it leads to a limited availability due to fix or quasi-fix resources.

the TV station broadcasting the games. Thus, they are both inelastic in supply, due to the fixed amount of games (artificial inelasticity of resources supply according to the rules of the Fédération Internationale de Football Association), as well as rare, since it can be assumed that, due to being valuable, their demand exceeds supply. The same logic can be applied for games within the 2nd and 3rd German Soccer League; but since there is not the same interest in those games it is questionable whether demand exceeds supply. Hence, this resource is by definition inelastic in supply, yet not rare in terms of resource-based logic. Also, a resource can be rare without being inelastic in supply. Looking at top soccer players, it is reasonable to presume that their demand exceeds supply and thus, that they are rare resources. However, they are not totally fixed in supply, since they are expandable over time through respective training efforts. Accordingly, the two constructs of rareness and supply inelasticity are distinct from each other.

Regarding resources' supply inelasticity and inimitability, I want to recall the different imitation barriers outlined in chapter 2.3.3.1: social complexity, causal ambiguity, and firm-specific historical development. The first two barriers entail resources' immobility (non-tradability and non-transferability) and, hence, endorse resources' supply inelasticity (quasi-fix resources). Firm-specific historical development, however, argues, on the one hand, that resources have unique historical backgrounds that can not be reproduced (path dependencies), and, on the other hand, that time compression diseconomies and asset mass efficiencies will impede resources' imitation. Nonetheless, imitation is theoretically possible, even though most of the time not economically justifiable, and, hence, those resources are not inelastic in supply. Thus, not all resources that are inimitable in terms of resource-based logic are also inelastic in supply. Yet, all resources that are inelastic in supply are per definition inimitable, since this is the necessary condition for supply inelasticity, i.e., inimitability guarantees fixed resource supply. Accordingly, the two constructs of inimitability and supply inelasticity are only partly distinct from each other.

Regarding information asymmetry, I argue that significant uncertainty about the actual value of a resource, i.e., the existing information asymmetries among competitors, leads to imperfect factor market conditions.[207] Within these markets, the only way (besides luck) for a firm to gain rents (entrepreneurial (Schumpeterian) rents) through valuable resources is to have more precise information about the resources' future value to the firm.[208] Information asymmetries arise from two different uncertainty sources: (a) the uncertainty among

[207] Cf. Peteraf (1993), p. 185.
[208] Cf. Barney (1986), p. 1231.

competitors about the link between resources and performance (i.e., causal ambiguity as explained in chapter 2.3.3.1), and (b), according to Barney (1986), "these differences [i.e., information asymmetries] reflect uncertainty in the competitive environments facing firms."[209] The latter refers to *environmental uncertainty*, being defined as a perceptual construct assessing uncertainty sources of a firm's environment.[210] Moreover, environmental uncertainty also enhances causal ambiguity. The inference is the degree of uncertainty that exists in a strategic factor market (i.e., environmental uncertainty) can be an indicator of the extent to which that market is imperfectly competitive.[211]

Following Dess and Beard (1984), the degree of *environmental uncertainty* affecting information asymmetries depends upon three different environmental conditions: it increases with high *dynamism* and high *complexity*, and is affected by *industry concentration* (i.e., environmental uncertainty decreases with high, and increases with lower industry concentration[212]).[213] Markets under such conditions will show information asymmetries which in turn will – ex ante – lead to different expectations about the value of resources and also – ex post – face competitors with greater imitation and substitution difficulties mostly due to higher ambiguity.

Thus, regarding ***markets*** as the third central construct within RBT, I will concentrate on the impact of two conditions: resources' *supply inelasticity* and *information asymmetry*.

After having outlined the historical development of RBT, its basic assumptions as well as its central constructs, the following section will review the central propositions of the theory discussed within the literature. Surprisingly, only one contribution could be found within RBT that specifically outlines four resource-based propositions, i.e., the book chapter of Barney and Arikan (2001). Yet, the authors concurrently concede that there are more than these four propositions[214] and also, within Barney and Arikan's (2001) propositions, there is still confusion regarding the dependent variable as well as the central constructs and their

[209] Barney (1986), p. 1233.
[210] Cf. Buchko (1994), p. 411; Milliken (1987), p. 133ff.
[211] Cf. Barney/Arikan (2001), p. 143.
[212] In other words, the degree of environmental uncertainty varies with the extent of realized or potential collusions depending on the respective industry concentration. Cf. Kotha/Nair (1995), p. 499.
[213] Cf. Kotha/Nair (1995), p. 499; Dess/Beard (1984), p. 55. Regarding Dess and Beard's (1984) definition of environmental uncertainty, one core construct (i.e., environment's munificence) does not apply for our purpose, i.e., for increasing information asymmetry. Munificence reflects the capacity of the environment to support organizations in the marketplace (i.e., to support sustained growth). As such it has an impact on environmental uncertainty regarding the questionable supply of resources, i.e., low munificence implies limited availability of resources, yet, it does not affect information asymmetry.
[214] Cf. Barney/Arikan (2001), p. 141.

conditions in general.[215] Therefore, within the next chapter, I will use the conclusions drawn so far to revise and improve these propositions and, thus, be able to derive the central propositions of RBT.

2.4 Propositions within Resource-based Theory

This section analyzes the interactions between the three central constructs and their conditions to conclude on the theory's framework. Consequently, the central proposition of RBT will be derived according to this framework.

2.4.1 Framework

First, the impact of resource conditions on rent conditions will be outlined as well as the impact of market conditions on resource conditions. Afterwards, I will concentrate on the overall interdependencies between resource conditions, market conditions, and rent conditions, and present a framework of RBT.

(1) Resources and Rents

Gaining rents through valuable resources, the remaining three resource conditions will influence the rents' durability, i.e., temporary vs. persistent. Here, in order to gain *temporary rents*, resources must be *valuable* and *rare* at the same time. Otherwise, competitors could easily acquire the same resources and would be able to implement the same strategy and gain the same market position.[216] In order to gain *persistent rents*, these resources must also be *inimitable* and *non-substitutable*. Otherwise, competitors would be able to consider and implement the same strategy by simply imitating the resources which support this special advantage, or by replacing them with strategic equivalents.[217]

(2) Resources and Markets

The degrees of the four resource conditions can be influenced by the two prevailing market conditions discussed above. These influences are depicted in Table 1.

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[215] Within chapter 2.4.2 I will thoroughly address these confusions as well as outline Barney and Arikan's (2001) propositions in more detail.

[216] Cf. Barney (1991), p. 102; Peteraf/Barney (2003), p. 316. "…firms with superior resources in terms of their ability to generate more value will have a competitive advantage in terms of differential residual value. We know […] that greater residual value translates into a rent advantage. If the superior resources are 'scarce in the sense that they are insufficient to satisfy demand for their services' (Peteraf, 1993: 180), then the surplus is indeed properly viewed as rent. This is true whether the resources are strictly limited in supply or whether they are 'quasi-fixed', in the sense that their supply can only be expanded slowly." Peteraf/Barney (2003), p. 317.

[217] Cf. Barney (1991), p. 102. Identifying the necessary information for resource imitation or isolating substitutes is more time-consuming compared to discovering the value of a resource or its state of rareness. These two conditions become important when realising persistent rents.

	Resource Conditions:			
Market Conditions:	**Value**	**Rare**	**Inimitable**	**Non-substitutable**
High supply inelasticity	***no assertion***	implies ***fixed / quasi-fixed supply of resources,*** i.e., limited availability	implies ***inimitability*** of fixed / quasi-fixed resources	***no assertion***
High information asymmetry	***no assertion*** [causes different expectations about the value of resources]	***no assertion***	leads to ***higher imitation-barriers*** due to ambiguity towards the resource-performance relationship	leads to ***higher substitution difficulties*** in isolating possible substitutes

Table 1: Interdependencies between Resource and Market Conditions

Regarding factor markets with *high supply inelasticity*, the two significant effects on resource conditions are on the *rareness* and *imitability* of such resources. As argued above, the rareness of a resource exists – per definition – as long as its availability is limited and, thus, the prevention of perfect competition through a permanent surplus of demand is guaranteed. Here, due to a resource's supply inelasticity, the availability of the resource is limited, i.e., the resource's supply is fixed (or quasi-fixed, i.e., immobile resources) and hence, resources are most likely to be considered rare. Additionally, following the argumentation in chapter 2.3.3.3, resource factor markets that show supply inelasticity imply resource's inimitability.

Apart from these two conditions, the degree of value and non-substitutability will not be implicitly affected due to supply inelasticity. Even though *value* seems to be always largely determined by the environment, its degree is only assessable in combination with a specific industry and a specific resource (or at least a resource-category). Thus, a resource's supply inelasticity has no implicit effect on a resource's value in general, meaning one can not infer from supply inelasticity that resources in general are either more or less valuable. Regarding the resource's *non-substitutability*, a resource being inelastic in supply does not indicate whether it can or can not be replaced by either a very similar resource or by a strategic equivalent. One might argue though, that due to higher imitation barriers it will be more difficult to identify the resource one wants to substitute and, thus, the possibility of replacing it with a very similar resource might be impeded. Yet, there will always be the possibility of replacing it with strategic equivalents as long as competitors can assess the impact of the resource, and its strategy, on performance.

Regarding factor markets with *high information asymmetries*, there are basically two significant effects on resource conditions: on the *imitability* and *non-substitutability* of resources. High information asymmetries result from environmental uncertainty and the

thereby increasing ambiguity towards the resource-performance relationship.[218] Hence, *imitability* becomes more difficult and, consequently, in imitating this highly ambiguous resource-performance structure competitors are likely to fail. Similarly, due to high information asymmetries, it becomes difficult for competitors to isolate possible *substitutes* in general, i.e. difficulties in isolating very similar resources as well as strategic equivalents.

Other than these two, the degree of value or rareness will not be implicitly affected due to information asymmetries. Even though high information asymmetries will lead to different expectations among competitors about a resource's *value*, again, its degree is only assessable in combination with a specific industry as well as a specific resource as discussed above. Regarding the *rareness* of a resource, high information asymmetries make no assertion towards the degree of rareness whatsoever.

(3) Framework

Combining these coherences with the theory outlined so far, the following Figure 3 represents the framework of RBT:[219]

[218] Cf. Lippmann/Rumelt (1982), p. 420.
[219] Cf. Peteraf (1993), p. 186; Peteraf/Barney (2003), p. 316.

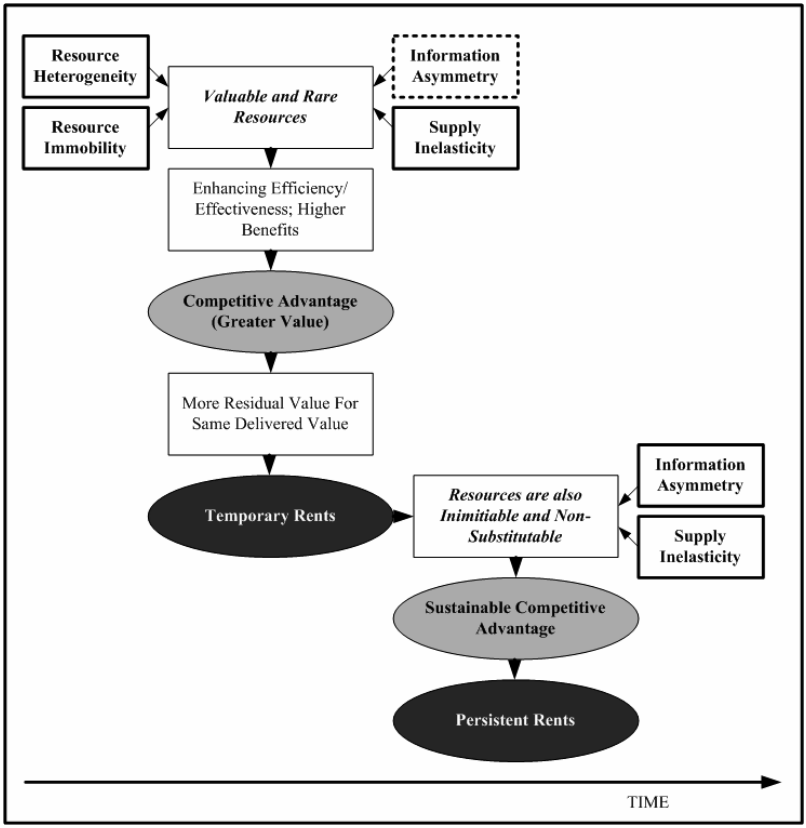


Figure 3: From Resources to Competitive Advantage to Rents

2.4.2 Six Central Propositions

In order to deduce the central RBT propositions, Table 2 summarizes the interdependencies discussed so far, concentrating on the necessary resource conditions in order to gain rents under certain market conditions.

Rents:	Generic Propositions:	Integrate Factor Market Conditions:	
		High supply inelasticity	High information asymmetry
Temporary	Value & Rareness	Value	Value
Persistent	Value, Rareness, Inimitability, & Non-Substitutability	Value & Non-Substitutability	Value & Rareness

Table 2: Categorization of Central RBT Propositions

The two generic propositions regarding RBT assert that resources have to be valuable and rare for temporary rents and also inimitable and non-substitutable for persistent rents. Hence, the following propositions can be derived:

> ***Proposition 1a:*** *Firms that acquire or develop valuable and rare resources can gain at least temporary economic rents by using them to develop and implement strategies.*
>
> ***Proposition 1b:*** *If these resources are also inimitable and non-substitutable, these firms can gain persistent economic rents.*

These propositions apply within factor markets with low distortions (i.e., low environmental uncertainty, rather elastic supply, and low entry and exit barriers). Thus, it should be mentioned that these propositions refute the argumentation of Foss and Knudsen (2003) within their debate with Peteraf and Barney (2003) on the topic of necessary assumptions for RBT's framework: Foss and Knudsen (2003) argue that the assumption of resource heterogeneity is not necessary for explaining rents because resource heterogeneity is dissolved by the assumptions of uncertainty and immobility.[220] Yet, within markets of low distortions it becomes apparent that resource heterogeneity can exist without resulting from uncertainty (i.e., heterogeneity in expectations) and without resulting from immobility (i.e., heterogeneity due to supply inelasticity). Instead, circumstances such as path dependencies, chance events, governmental largesse, and unevenly distributed property rights can also lead to resource heterogeneity and, consequently, these resources can be a source for gaining rents for the firm.[221] Moreover, according to Peteraf and Barney (2003), the condition of heterogeneity is so fundamental to RBT, "that it is the *sine qua non* of this theory. Without differentiable resources, RBT makes no contribution of its own and ceases to be a theory

[220] Cf. Foss/Knudsen (2003).

[221] Cf. Peteraf/Barney (2003), p. 311; Peteraf (1993), p. 180ff. Also, Lippman and Rumelt (1982) argue that "…if the original uncertainty stems from a basic ambiguity concerning the nature of the causal connections between actions and results, the factors responsible for performance differentials will resist precise identification. Under such conditions the uncertainty attaching to entry and imitative attempts persists and complete homogeneity is unattainable. Thus, persistent differentials in profitability may be consistent with free entry and fully competitive behavior." Lippman/Rumelt (1982), p. 418.

discrete from other analytical tools. With such resources, it adds a unique perspective to the literature on firm performance."[222]

Next, integrating factor market conditions of high supply inelasticity, resources have to only be valuable to generate temporary rents since they are expected to be rare. Due to supply inelasticity the resource's supply is either fixed or quasi-fixed. These resources are considered to be of limited availability and, due to being valuable, are also expected to be exposed to strong demand and thus most likely to be rare. In order to gain persistent rents under this condition, resources which are inelastic in supply have to be valuable and non-substitutable, because inimitability is per definition implied through supply inelasticity. Therefore, the following propositions can be derived:

> ***Proposition 2a:*** *Firms that acquire or develop valuable resources that are inelastic in supply can gain at least temporary economic rents by using them to develop and implement strategies.*
>
> ***Proposition 2b:*** *If these resources are also non-substitutable, these firms can gain persistent economic rents.*

To generate temporary rents under high information asymmetry resources have to only be valuable because competitors cannot easily detect the resource's value and its impact on performance and will therefore not set out to acquire the same resources, i.e. these resources do not have to be rare at this point. In order to gain persistent rents under this condition, a resource has to be valuable and rare. Whereas information asymmetry will impede a resource's imitability and non-substitutability as discussed above, I argue that competitors are at least able to detect the resource's value after a period of time. This resource should be rare in order to realize persistent rents.[223] Thus, the following propositions can be derived:

> ***Proposition 3a:*** *Firms that acquire or develop valuable resources under high information asymmetry can gain at least temporary economic rents by using them to develop and implement strategies.*
>
> ***Proposition 3b:*** *If these resources are also rare, these firms can gain persistent economic rents.*

Next, Barney and Arikan's (2001) propositions will be outlined in order to critically assess and compare them to the propositions derived within this chapter.

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[222] Peteraf/Barney (2003), p. 311 (emphasis in the original).

[223] Similarly, Peteraf and Barney (2003) argue that "…heterogeneous resources can result in sustained competitive advantage even when there is certainty, ex post, regarding the nature of the advantage. Just because it is possible to identify the cause of an advantage does not imply that it can be duplicated." Peteraf/Barney (2003), p. 311.

2.4.3 Discussion on Barney and Arikan's (2001) propositions

As mentioned above, Barney and Arikan (2001) present an outstanding review on the origins and development of RBT, containing amongst others a detailed description of the theoretical history of RBT as well as of its core tenets. They are the only scholars outlining central resource-based propositions, i.e., the following four propositions, while noting that these are the most important within RBT, yet not the only ones:[224]

> Proposition 1: Firms that acquire or develop valuable resources in imperfectly competitive strategic factor markets can gain at least temporary economic rents by using them to develop and implement strategies.
>
> Proposition 2: Firms that control valuable, scarce, and non-substitutable resources can gain at least temporary competitive advantages by using them to develop and implement strategies.
>
> Proposition 3: Firms that control valuable, scarce, and non-substitutable resources that are inelastic in supply can gain persistent competitive advantages by using them to develop and implement strategies.
>
> Proposition 4: Firms that continue to use valuable resources to develop and implement strategies in ways others cannot anticipate can gain sustained economic rents.
>
> (Barney and Arikan (2001), p. 141f)

In the following, I will respond to these propositions and show why it was appropriate and necessary to revise, improve and complete them, as done within the previous chapter.[225] *First of all*, the authors themselves agree that these four propositions are not complete and that there are more propositions they do not name. *Second*, as one can easily see, Barney and Arikan do not offer a distinct dependent variable, i.e., they concentrate on both competitive advantages and economic rents. Furthermore, it is not completely understandable why the authors choose different dependent variables within the four propositions; looking at the propositions, using competitive advantage or rents seems interchangeable. *Third*, the authors do not differentiate between the different market conditions, which could have an impact on rent generation, i.e., they refer merely to the combined state of imperfectly competitive factor markets or solely to environmental uncertainty. For instance, within their first hypothesis Barney and Arikan argue that firms will gain rents with valuable resource in imperfectly competitive strategic factor markets, whereas in their fourth hypothesis, the authors conclude that firms will gain sustained rents with valuable resources within markets of high environmental uncertainty ('in ways others cannot anticipate'). Accordingly, in their fourth hypothesis they do not consider markets' supply inelasticity and, thus, neglect that resources must also be rare in order to gain sustained rents. *Fourth*, Barney and Arikan do not explain

[224] Cf. Barney/Arikan (2001), p. 141f.
[225] See chapter 2.4.2.

why resources also have to be non-substitutable in order to gain *temporary* competitive advantages. As outlined and summarized within the previous chapters, a resource needs to be non-substitutable in order to gain *persistent* rents, because it will take time for competitors to analyze and identify a resource's substitutes.[226] *Finally*, there is a lack of distinguishing between the central constructs regarding the immobility of resources, their supply inelasticity and, above all, their inimitability which is not being referred to at all. Thus, within the previous chapters I have tried to clarify the constructs' definitions, how they can be distinguished, as well as their interdependencies towards generating rents.

2.5 A Critical Assessment: Resource-based Theory?

Referring to the discussion at the beginning on 'What is Theory?', I would like to point out that in this chapter, so far, (1) the RBT's historical development as well as its main assumptions have been outlined; (2) the theory's central constructs have been assessed and explained while also focusing on their interconnectedness; (3) a framework for RBT has been provided; and finally (4) six central propositions have been derived. Regarding point (5), the review in chapter 3 as well as the meta-analysis in chapter 4 will provide proof that the empirical results will endorse RBT. The request concerning the falsifiability of good theory, i.e., that (6) theory must not be tautological, will be discussed in the following section on the theory's most frequent criticism.

Regarding the theory's most frequent criticism, the literature argues that (1) resource-based theory offers limited prescriptive implications; (2) resource-based theory more or less neglects the role of product markets; (3) resource-based theory is inherently static and not dynamic; and, finally, the most profound criticism that (4) resource-based theory is partially tautological and empirically not testable.[227]

(1) Limited prescriptive implications

First of all, RBT is argued to have only limited prescriptive ability.[228] For instance, Priem and Butler (2001a) argue that there is limited prescriptive ability towards the significance of specific resources because the definition of resources is all inclusive, which is true for most RBT papers.[229] Yet, as outlined in chapter 2.3.3.1, relying on an extended – i.e., an all

[226] See chapter 2.4.1 point (1) as well as footnote 217.
[227] This chapter aims at giving an overview of the basic criticism. For an extensive and detailed description see Freiling (2001), p. 41ff and (2000), p. 33ff; Priem/Butler (2001a+b); Barney (2001); and Bromiley/Fleming (2000).
[228] Cf. Priem/Butler (2001a), p. 34; Barney (2001), p. 49.
[229] Cf. Priem/Butler (2001a), p. 32.

inclusive – resource definition avoids ignoring significant resources and should thus be favored.[230] Generating a universal list of significant strategic resources for firms is obviously impossible because the evaluation of the strategic value of a resource is context specific, i.e., depends upon certain environment and industry settings.[231] Identifying significant resources is nevertheless possible for managers through assessing the level of the four resource conditions, i.e., are the resources of interest valuable, rare, inimitable, and non-substitutable. Following Barney (2001), the inclusiveness of resources therefore rather enhances the prescriptive implications of RBT, instead of reducing them.[232] Furthermore, Priem and Butler (2001a) assert that these resource conditions are not amenable to managerial manipulation, e.g., social complexity, causal ambiguity, etc. Even though these conditions are in fact difficult to manipulate they can, for example, serve as measures for identifying the firm's overall potential for gaining sustainable competitive advantages and help realizing and developing it through exploiting those resources with strategic potentials. Moreover, revealing resources with strategic potentials that are, for instance, exposed to causal ambiguity, firms can engage in assuring their maintenance through at least identifying and locating the source of such ambiguity (e.g., specific HR skills in R&D) without the need to fully understand their cause and effect chains. Also, these conditions can be used within the process of benchmarking, i.e., looking for valuable and rare resources the firm currently does not possess and trying to imitate or substitute these resources to at least gain strategic parity.[233]

(2) Role of product markets

Second, RBT is accused of neglecting the role of product markets.[234] Yet, since determining the value of resources will always be context dependent, resource-based theory implicitly includes, i.e., employs the view of product markets.[235] Furthermore, the value of resources can always change due to changes within the industry and environment, thus, integrating an external analysis becomes indispensable.[236] In other words, to fully explain competitive advantages and performance differences within strategic management, a complete model should integrate both models of competitive environment (product market models) and

[230] Cf. Barney (2001), p. 51 as well as chapter 2.3.3.1.
[231] See point (2). Cf. Barney (2001), p. 51.
[232] Cf. Barney (2001), p. 50.
[233] Cf. Barney (2001), p. 49. See Barney (2001), p. 49ff for more details on this discussion.
[234] Cf. Priem/Butler (2001a), p. 29.
[235] Cf. Barney (2001), p. 42 and p. 48f; Barney (1991), p. 106; Bamberger/Wrona (1996a), p. 391 and (1996b), p. 140; Börner (2000), p. 690; Rühli (1994), p. 50.
[236] Cf. Mahoney/Pandian (1992), p. 371; Penrose (1959), p. 79.

models of firm resources (factor market models).[237] This understanding already appeared in Wernerfelt's paper in 1984, as he outlined that the product market and factor market are basically two sides of the same coin.[238]

(3) Static vs. dynamic

Third, critics assert that RBT is a static rather than a dynamic concept. They argue that establishing resources' strategic potentials (i.e., showing that the resource is valuable, rare, inimitable, and non-substitutable) is a rather static argument, which (a) is merely descriptive, i.e., describes generic resource characteristics without differentiating between resources or context situations and (b) only provides insights a posteriori into which resources are responsible for performance differences.[239] Nonetheless, researchers generally agree that dynamic analyses of sustainable competitive advantages and rents have to be emphasized to fully explore RBT and its implications. And even Priem and Butler (2001a) admit that the early, and basic, RBT contributions are dynamic, e.g., Penrose (1959), Wernerfelt (1984), Dierickx and Cool (1989), and Barney (1991).[240] Furthermore, the concept of dynamic capabilities underlines the necessity of being able to adapt to dynamic change and being able to predict the length of current advantages as well as the source of future advantage.[241] However, a lot of RBT work has in fact been rather static. To focus on dynamic approaches, theoretically, researchers have to employ either an equilibrium or evolutionary analysis approach. For instance, through describing an economic system's equilibrium and then comparing that equilibrium to a system's actual state, researchers can predict change over time. Through studying system dynamics by comparing the state of a system at one time with the state of that system at a later time, researchers even have the possibility to study the dynamics of systems with equilibriums. Regarding empirical work, researchers should try to apply time series approaches to assess change. Within RBT, Barney (2001) argues that there are several equilibrium and evolutionary approaches to dynamic analysis, e.g., Lippmann and Rumelt (1982), Barney (1986), Makadok and Barney (2001), Barnett et al. (1994); and Teece et al. (1997).[242] Therefore, RBT does not exclude dynamic approaches.

[237] Cf. Barney (2001), p. 49; Bamberger/Wrona (1996b), p. 147; Knyphausen (1993), p. 786; Sanchez/Heene (1997), p. 304; Friedrich (2000), p. 12; McKiernan (1997), p. 794f; Spanos/Lioukas (2001), p. 909; Priem/Butler (2001), p. 35.
[238] Cf. Wernerfelt (1984), p. 171.
[239] Cf. Priem/Butler (2001a), p. 33.
[240] Cf. Priem/Butler (2001a), p. 33; Barney (2001), p. 52.
[241] Cf. Eisenhardt/Martin (2000).
[242] Cf. Barney (2001), p. 51f.

(4) Tautology claim

Fourth, the most frequent criticism of RBT is that it is tautological and lacks empirical testability, i.e., "…that its primary assertions are true by definition and, thus not subject to empirical test."[243] Basically, critics argue that the theoretical constructs are defined in ways that are tautological, e.g., resources are defined in terms of performance outcomes associated with them.[244]

> Following Bacharach (1989), the authors [Priem/Butler] attempt to demonstrate the tautological nature of the 1991 argument by substituting the definitions of value, rarity, and strategic advantage given there into what they characterize as one of the central empirical assertions of the RBV: only valuable and rare resources can be sources of competitive advantage. The assertions thus derived are clearly tautological. However, the fact that Priem and Butler are able to restate parts of the 1991 argument in ways that make it tautological is not the same thing as demonstrating that the argument is, in fact, tautological. It is important to recognize that, at this definitional level, all strategic management theories are tautological in the way Priem and Butler describe. (Barney (2001), p. 41)

The resource definition outlined in chapter 2.3.3.1 clearly shows that this definition is not concerned with tautology reproaches, because here, resources are not defined in terms of performance outcomes. Instead, valuable resources are those resources that have a significant cost-lowering or benefit-enhancing effect, whereas this effect is not deterministic regarding the overall performance of the firm.[245] Additionally, critics argue that the general empirical testability of these constructs is not given, because some of the theory's central constructs are of metaphysical character.

> Thus, the ability to restate a theory in ways that make it tautological provides no insights about the empirical testability of the theory whatsoever. […] the issue is not tautology, per se, but, rather, whether the proposition derived from a tautology can be parameterized in a way that makes empirical testing possible. (Barney (2001), p. 42)
>
> After all, in few theories do researchers fully parameterize all the concepts they use to derive empirical assertions. However, if at least some of these concepts are parameterized, then it is possible to deduce testable empirical assertions from these theories. (Barney (2001), p. 45)
>
> Of course, logical debates about whether the 1991 argument is tautological would be moot in the face of rigorous empirical tests. (Barney (2001), p. 46)
>
> Scholars continue to ask, "How does one measure resources?" Usually, the question they are really asking is "How does one measure resources, easily?" The answer is, of course, that you don't measure resources easily. (Barney and Mackey (2005), p. 11)

[243] Barney (2001), p. 41.

[244] Cf. Peteraf/Barney (2003), p. 320; Priem/Butler (2001a), p. 23f; Barney (2001), p. 41f as well as Mosakowski/McKelvey (1997); Bromiley/Fleming (2000); Foss/Knudsen (2003); and Lüdeke et al. (2006) for further discussions. Lüdeke et al. (2006) are looking at this debate from a conceptual point of view regarding tautologies. They outline different types of tautologies and different theoretical contexts and argue that within this debate researchers do not thoroughly distinguish between these concepts. Basically, Lüdeke et al. point out that both parties deny the validity of each others arguments and talk at cross-purposes. Cf. Lüdeke et al. (2006).

[245] Cf. Peteraf/Barney (2003), p. 320. Similarly, Eisenhardt and Martin (2000) who acknowledge the tautology problematic and thus through defining dynamic capabilities "…in terms of their functional relationship to resource manipulation, their value is defined independent of firm performance. This enables empirical falsification." Eisenhardt/Martin (2000), p. 1108.

The following chapter 3 will show that there are several ways to parameterize and thus test the theory's constructs by providing a variety of operationalization examples. Through attending to the actual empirical tests of RBT, this debate will in fact become moot, and therefore, facilitate the transition from a resource-based *view* to a resource-based *theory*.

3 Review of Empirical Research within RBT

"Most empirical studies lead from theory to data. Yet, the accumulation of knowledge involves a continual cycling between theory and data."

Eisenhardt (1989), p. 549.

As outlined in chapter 2, the importance of firm resources for gaining rents, i.e., the RBT, seems no longer questionable in theory, but empirical evidence on its role in strategic management is still in progress. In other words, RBT has become theoretically established in strategic management, yet, the question where we empirically stand is still to be resolved.[246] Whether the central propositions of RBT withstand – overall – empirical testing is still a question unanswered, as is the query whether these empirical results might even revise RBT in general.

Following Eisenhardt (1989), in order to improve (resource-based) theory, we need to take a closer look at empirical results, try to consolidate the research outcomes and identify their impact on the development of the theory.[247] Good theory development requires the accumulation of knowledge from both research perspectives: the gathering and processing of theoretical and empirical results, i.e., a continual cycling between theory *and* data. However, to my knowledge, no such cycling process has taken place. Especially relating to the question of the central constructs' empirical testability, there is no systematic approach of a comprehensive analysis of empirical resource-based research in the literature. Yet, taking up the debate from the beginning, in order to ultimately confute the tautology criticism "…the critical issue is […] whether at least some of the elements of that theory have been parameterized in a way that makes it possible to generate testable empirical assertions."[248]

Therefore, in this chapter I will conduct a comprehensive review of empirical research contributions, focusing on the parameterization of the theory's constructs and propositions outlined within chapter 2. *First of all*, I will describe the selection process of the articles, which form the database for the following analysis. Here, I will also give an overview of the articles under review regarding the source and the year in which they were published, as well as their research area. *Second*, regarding the articles' research models, I will provide details on the operationalization of the central RBT constructs, including details on the operationalization of the independent variables (resources), dependent variables

[246] Cf. Wernerfelt (1995), p. 171f; Hoskisson et al. (1999), p. 437ff; Ambrosini/Bowman (2001), p. 825.
[247] Cf. Eisenhardt (1989), p. 549.
[248] Barney (2001), p. 42.

(performance), and context variables (markets). Additionally, I will give guidelines concerning best practices from the review on how to parameterize each of these constructs. On the subject of operationalizing the four resource conditions, i.e., value, rareness, inimitability, and non-substitutability, I will integrate and combine the variety of items from the review, to facilitate future scale developments. *Third*, I will provide examples for operationalizing the central propositions from the review. *Finally*, the last section will summarize the main findings and conclude that the results from this review add to the theoretical results from chapter 2 and, thus, enforce the shift from a resource-based *view* to a resource-based *theory*.

3.1 Database

To conduct a review and analysis of empirical research, the first step is to perform a content analysis of work published on topics concerning the RBT. Essentially, the goal is to identify a representative sample of research that statistically tests the core tenets of RBT and, thus, operationalizes its central constructs.[249] In order to rely on a suitable database for the analysis, several restrictions were imposed; those will be outlined in the next section on the selection process of the articles.[250] Afterwards, I will give a brief overview of the articles within the database.

3.1.1 Selection Process

In selecting a representative sample of empirical articles on RBT, the *first restriction* was to only focus on published articles, thereby excluding book chapters, or unpublished work. The reason for including only published articles adds up to the fact that they have been through several review processes, which guarantees a certain amount of quality. Following Light and Pillemer (1984), such a restriction may enhance quality control since most refereed journals have very strict publication requirements; hence, that usually leads to better technical products.[251] Even though some critics refer to the overestimation of effects due to the bias of publishing only significant results, Hunter and Schmidt (1990) were able to refute this claim; their results showed that both published and unpublished studies produced similar findings.[252] Additionally, David and Han (2004) refer to this problematic in their review of empirical

[249] Here, I want to isolate a large but manageable sample of empirical resource-based studies. Thus, note that this database does not claim to be comprehensive in the sense of including all tests of RBT.
[250] In retrieving a representative sample of empirical RBT articles, I followed David and Han's (2004) systematics within their comprehensive review on transaction cost economics. Cf. David/Han (2004), p. 42ff.
[251] Cf. Light/Pillemer (1984), p. 35.
[252] Cf. Hunter/Schmidt (1990), p. 507ff.

research on transaction-cost economics and, in quoting Cooper (1989), conclude that "…relying on published results is appropriate "when the published research contains several dozen, or in some cases several hundred, relevant works. In such an instance it is likely that while the published research may overestimate the *magnitude* of the relation, it probably will not incorrectly identify relation *direction*.""[253]

The *second restriction* was to focus on the following two databases: ABI/INFORM Complete™ (hereafter ABI) and Business Source Complete (hereafter BSC). Together they include over 1,800 business related journals and, most importantly, they both begin coverage before the birth of the RBT, i.e., before 1984.[254] With the *third restriction*, a representative sample of RBT articles, which operationalized the core constructs and empirically tested the core tenets of the theory, had to be defined. Therefore, both databases were first searched with the keyword RESOURCE-BASED*, where the '*' indicates that different endings for this word were permitted. This produced over 2,100 hits. To further refine this search, as a *fourth restriction*, I concentrated on RBT-work published within the last two decades (more precisely, from 1984 to 2004). This time-period was chosen, because the expression "RBV" originated in Wernerfelt's article in 1984, "A Resource-based View of the Firm".[255] Here, the outcome of these search parameters still exceeded over 1,700 hits. Besides the fact that this was hardly a manageable amount of articles, briefly scanning these hits revealed that they were not correct as regards RBT content, i.e., too much substantive relevance was missing. For example, articles appeared, such as "Predictors of Behavioral Loyalty among Hikers along the Appalachian Trail",[256] discussing the processes leading to the formation of recreationist loyalty, where the keyword appears within their abstract, arguing that "…in the context of natural RESOURCE-BASED recreation the concept of loyalty is most often used to refer to recreationists' attachments to specific recreation areas."[257] Clearly, this is a non-RBT article. Thus, to further narrow down the substantive relevance and limit the number of articles, as a *fifth restriction* I included fifteen additional keywords derived from the theory

[253] David/Han (2004), p. 42 citing Cooper (1989), p. 58, while the emphases are added by David and Han.
[254] The database *Business Source Complete* contains indexing and abstracts for the most important scholarly, peer-reviewed business journals back to 1886, i.e., for more than 1,200 journals. As for *ABI/INFORM Complete*™, it is one of the most comprehensive business databases on the market today, featuring nearly 4,000 journals (1,800 worldwide business periodicals included within ABI/INFORM Global, a product included in ABI/INFORM Complete™) and offering nearly 3,000 full-text titles covering a variety of business and economic related topics. Its coverage starts with 1923. See http://support.ebsco.com/knowledge_base/detail.php?id=2430 for more details on BSC, whereas for ABI/INFORM Complete see http://www.proquest.com/products_pq/descriptions/abi_inform.shtml.
[255] Cf. Wernerfelt (1984).
[256] Cf. Kyle et al. (2004).
[257] Kyle et al. (2004), p. 99, capital letters added.

outlined in chapter 2.3. In order to still be included, besides RESOURCE-BASED*, each article had to contain one of the following additional keywords: STRATEGIC RESOURCE*, INTANGIBLE, TANGIBLE, VALUABLE, RARE, INIMITABLE, NON-SUBSTITUTABLE, RENT*, FIRM PERFORMANCE, SUSTAINAB*, COMPETITIVE ADVANTAGE, STRATEGIC FACTOR MARKET, INFORMATION ASYMMETRY, IMMOBILITY, or HETEROGENEITY.[258] For instance, an article with INIMITABLE and RESOURCE-BASED* would be selected, whereas an article with only one of these two keywords would be excluded. Overall, this produced 1,081 hits; 529 within BSC and 552 within ABI.[259] After eliminating repetitions within both databases and also between the two databases, i.e., articles that occurred more than once within BSC or ABI as well as articles that both occurred within BSC and ABI, 448 articles remained.

Next, to further verify the substantive relevance of these 448 articles, I decided, as a *sixth restriction*, to augment a quality measure with the selection process. Relying on expert opinions can be accounted as a quality measure in terms of whether research experts in the RBT would consider these articles suitable or not. Regarding the variety of Barney's contributions in conjunction with RBT – for example, Barney (1986, 1991, 1996, 2001), Barney and Zajac (1994), Mata, Fuerst, and Barney (1995), Peteraf and Barney (2003), Ray, Barney, and Muhanna (2004), and Barney and Mackey (2005) – as well as the quality of his work – i.e., in view of citation factors and A-journal listings – Jay B. Barney can be considered as an outstanding expert within the field of resource-based research. In his contributions, recall that Barney and Arikan (2001) once identified and listed 166 empirical RBT articles in their book chapter "The resource-based view: Origins and implications" in "The Blackwell Handbook of Strategic Management".[260] So, in order to check for the substantive relevance of the 448 articles identified above, I rely on Barney's expert opinion and, hence, adjust Barney and Arikan's 166 articles with the 448 articles within the databases of BSC and ABI. Surprisingly, only 7% (31 articles) accorded. Here, instead of discarding either database, I decided to combine both. So, to enhance the overall substantive relevance,

[258] The first four keywords can be associated with the theory's central construct *resources*; analogous, keywords eight to eleven represent the construct *performance* and keywords twelve to fifteen the construct *markets*.
[259] At this point, David and Han (2004) decided to further include keywords that would distinguish between theoretical and empirical articles, i.e., they included additional keywords such as DATA, TEST, STATISTICAL, etc. Cf. David/Han (2004), p. 43. I followed their advice and tried to include these additional keywords, yet, after checking the results within the database for relevant RBT studies which have been frequently cited, important studies were missing, e.g., Knott (2003), Sharma and Vredenburg (1998), or Miller and Shamsie (1996). Thus, I decided not to include these keywords.
[260] See footnote 9 in chapter 1.

the remainder of 135 articles from Barney and Arikan were included within the database above, resulting in 583 potential articles at this point.

Next, in order to further meet the claims of both, refining the database with respect to its substantive relevance and also its manageability, as the *seventh restriction*, I chose to follow another filter-criterion used by David and Han (2004) based on the frequency of journal appearance. In their review on transaction cost economics, David and Han argue that many of the non-relevant articles were lone items from a particular journal, testing something completely different with only passing reference to the theory.[261] Here, the database contained articles from 175 different journals, whereas nearly 60% of the 583 articles were published within 14% (25) of these journals. Thus, I started scanning the journals which produced less than five articles and found a significant number of non-RBT articles. For example, within the *Scottish Journal of Political Economy*, Gylfason (2001) reviews the relationship between natural-resource abundance and economic growth around the world and argues that "…the principal reasons why RESOURCE-BASED production can inhibit economic growth over long periods are traced to the Dutch disease, neglect of education, RENT seeking, and economic policy failures."[262] Again, this is clearly a non-RBT article.[263] Thus, I decided to apply a final filter to the database and only include articles from journals which produced more than five hits, resulting in 25 journals and 338 articles. Furthermore, the journal citation reports (JCR) of these 25 journals affirm their substantive relevance: regarding the JCR rankings for the search field MANAGEMENT for the past three years, i.e., JCR rankings for 2002, 2003, and 2004, there are 10 of these 25 journals constantly amongst the top twenty, whereas the others are under the top eighty.[264]

The remaining 338 articles were then briefly scanned in full, whereas their abstracts were read carefully. In order to be retained, an article had to satisfy two main criteria: (1) it had to give an indication of empirical analysis, such as to mention sample size, specific industries or firms, specific countries or time periods, specific tests or results, or analytic techniques; and (2) an abstract had to refer to RBT in the substantive context of the definitions, assumptions and the framework as discussed in chapter 2. On the whole, a total of 213 empirical studies

[261] Cf. David/Han (2004), p. 43.
[262] Gylfason (2001), p. 558, capital letters added.
[263] Also, the article of Yu and Krishnan (2004) within the *Information Systems Journal* discusses RESOURCE-BASED agents in the context of a conceptual framework for agent-based agile manufacturing cells and argues different PERFORMANCE effects of these agents, which is obviously not a RBT-related contribution. Cf. Yu/Krishnan (2004), p. 93. And similarly, Nie (2003) within *Policy Science* explores the drivers of natural RESOURCE-BASED political conflicts, focusing on what factors turn "…the common political conflict into the high-level, symbolic, and SUSTAINED political conflict?" Nie (2003), p. 307, capital letters added.
[264] Cf. http://portal.isiknowledge.com/.

could be identified. Finally, in reading and coding these articles, the selection process described above proved to be quite accurate in retrieving empirical RBT studies. Nevertheless, there were still some articles not suitable for this purpose, e.g., articles which only referenced RBT without really testing it (i.e., no RBT-related dependent or independent variables), articles without adequate empirical data, as well as articles *masquerading* as RBT-articles. Regarding the latter, Priem and Butler (2001) point to the fact that sometimes researcher re-label their independent variables as resources and their dependent variables as rents or competitive advantages to create the impression that their study is an RBT-oriented (and thus more legitimate) study.[265] Similarly, Markman et al. (2004) assert that there have been limited explicit empirical tests of RBT – the authors argue that many studies used resource-based terms, yet, without referring to the constructs' nomological net or to their causal relationships.[266] After sorting out these articles, the final database showed 192 empirical studies.[267]

Table 3 gives an overview of the selection process outlined above:

Filter Description	Results BSC	Results ABI	Total
Keyword RESOURCE-BASED*	1,035	1,104	**2,139**
Keyword RESOURCE-BASED* *AND* Time-frame (1984-2004)	844	930	**1,774**
Keyword RESOURCE-BASED* *AND* at least one of the 15 Additional Keywords	529	552	**1,081**
Exclusion Duplicates within BSC *AND* ABI	311	308	**619**
Exclusion Duplicates between BSC *AND* ABI			**-171**
Total I (DB_BSC&ABI)			**448**
Inclusion of Remainder DB_B&A(2001)			**135**
Exclusion Journals < 5 Hits			**-245**
Exclusion Theoretical Articles (Scanning Process)			**-125**
Exclusion Masquerading RBT Articles (Reading Process)			**-21**
Total II (DB_Final)			**192**

Table 3: Summary of Selection Process

In the next section, a brief overview of the articles within the database will be given, outlining the number of articles per journal, their publishing year as well as their research area.

[265] Cf. Priem/Butler (2001), p. 33.
[266] Cf. Markman et al. (2004), p. 540.
[267] Within the reference section, each of these studies are marked with a '*' at the end of their reference.

3.1.2 Overview

Table 4 lists the 192 studies according to the journal and the year they were published.

Journal	Empirical Articles
AMJ	25
AMP	8
EMJ	4
ETP	4
HRM	3
IBR	3
IJHRM	9
IJOPM	6
IJTM	4
JHTMR	1
JIBS	5
JKM	1
JMS	4
JoM	9
JSBM	5
LRP	1
MD	1
MDE	1
MISQ	5
MS	3
OS	9
SIJ	3
SMJ	76
TECH	2
Total	**192**

Year	Empirical Articles
1984	2
1985	-
1986	-
1987	-
1988	-
1989	1
1990	-
1991	4
1992	1
1993	4
1994	8
1995	9
1996	13
1997	17
1998	19
1999	32
2000	20
2001	13
2002	15
2003	19
2004	15
Total	**192**

Table 4: Empirical RBT Studies (1984-2004)

Regarding Wernerfelt's (1995) assertion that, ten years after his publication in 1984, the RBT still lacked empirical improvement,[268] with 192 empirical studies a lot of researchers have evidently responded to this claim since then. Particularly, after the publication of Barney's article "Firm Resources and Sustained Competitive Advantage" in 1991, the research rate increased immensely (e.g., first decade 10%, second decade 90%), having hit the highest point in 1999 with 32 empirical publications.[269] Here, the two most frequented journals are SMJ with 76 empirical articles and AMJ with 25; together they amount to over 50% of the empirical articles.

[268] Cf. Wernerfelt (1995), p. 172.

[269] More recently though it seems that scholars have concluded on resource-based empirical research. Since 1999, one could note a declining effort in empirical research. One obvious reason could be a saturation of empirical results on RBT. In this case we should be able to rely on a sufficiently confirmed theory. Another explanation besides this could be that, due to occurring complications during the empirical testing of the RBT, researchers recoil from empirical work. In other words: researchers might not have the right methods at hand to properly explore resource-based theory. Throughout the review it will become apparent that the latter proves to be the more suitable explanation for the declining interest in resource-based empirical research. Therefore, chapter 5 will attend to this problem and evaluate suitable methods for better exploring RBT.

Moreover, Table 5 lists these articles according to the main research areas on which they focused, which are related to the Academy of Management's division and interest groups.[270]

Main Research Area & Specific Topics	# of Tests	% of Tests
Business Policy & Strategy	**46**	**24%**
M&A Strategies	8	-
Strategic Alliances	8	-
Diversification and Portfolio Strategies	12	-
Strategy Formulation and Implementation	8	-
Strategic Planning and Decision Processes	7	-
Others	3	-
Entrepreneurship	**10**	**5%**
Human Resources	**39**	**20%**
CEO Topics	3	-
TMT Topics	2	-
HRM practices	21	-
Human Capital	9	-
Others	4	-
International Management	**9**	**5%**
Operations Management	**6**	**3%**
Organization & Management Theory	**69**	**36%**
Firm vs. Industry Effects	10	-
Impact of Resources and Capabilities	59	-
Technology & Innovation Management	**13**	**7%**

Table 5: Overview of Empirical Studies according to their Research Area

As Table 5 indicates, most of the studies focused on subjects within the research areas of *organization and management theory*, *business policy and strategy*, and *human resources*. In case of organization and management theory, two specific topics can be classified: (a) *firm vs. industry effects*, which include articles suggesting that firm effects should have a larger impact on firm performance than industry effects, and (b) *the impact of resources and capabilities*, which include articles exploring a variety of different resources that are valuable, rare, inimitable, and non-substitutable as sources of sustained competitive advantages and rents, i.e., this research examines the impact of these resources on performance.[271] As the review reveals, with the emergence of RBT, researchers focused on the question of whether firm or industry effects were more important for sustainable competitive advantage.[272] Due to the positive results regarding firm effects, the focus shifted after 1998, and the firm itself

[270] See http://www.aomonline.org/aom.asp?id=18 and in the appendix for a specification of the research areas. Also, the appendix provides an overview of research questions and findings for each study categorized according to their research areas.
[271] Cf. Barney/Arikan (2001), p. 146.
[272] Cf. Hansen/Wernerfelt (1989); Rumelt (1991); Ingram/Baum (1997); Mauri/Michaels (1998). "This brings us to our major result that firm effects exist in the form of positive focus effects. That is, some differences in performance can be explained by efficiency differences firms experience in transferring competencies to widely varying markets. Interpreted in this way, this finding not only supports the revisionist view, it enriches it, since it also tells us something about the sources of efficiency differences." Wernerfelt/Montgomery (1988), p. 250.

became the phenomenon of interest. Now, researchers concentrated on the resources' and capabilities' impacts on firm performance.[273] The following section will question these articles on their operationalizations of the theory's central constructs – resources, performance, and markets – in order to prove RBT's general empirical testability.

3.2 Operationalization of RBT's Central Constructs

In this chapter, the 192 empirical studies will be analyzed for the following information: (1) how did researchers operationalize *resources* and their conditions (value, rareness, inimitability, and non-substitutability); (2) how did researchers measure *performance*, and did they try to explore competitive advantages and/or rents; and (3) how did scholars integrate context within their studies in order to take *market* conditions into account. Furthermore, guidelines will be developed in terms of 'best practices' on how to parameterize the central constructs and their conditions. As for measuring resources, I will also identify and consolidate items from the review used to represent the four resource conditions, as well as outline their reliability values.

3.2.1 Independent Variables: Resources

Concerning the central construct ***resources***, this section will give an overview on their operationalizations within the 192 studies, while also outlining a variety of examples within this connection. Moreover, items on the four conditions will be consolidated and, hence, guidelines for further empirical research will be provided.

3.2.1.1 Operationalizing Resources

To first concentrate on the operationalizations of ***resources***, Table 6 begins with briefly consolidating some interesting facts and findings on exploring and operationalizing *resources* and their *conditions*. For instance, considering ***resource-types***, 72% of the studies emphasized intangible resources (e.g., routines, capabilities, etc.) over tangible resources (e.g., physical or financial capital) with 15%, and 13% concentrated on resources in general.[274] According to the different ***resource-categories*** in chapter 2.3.3.1, 8% of the studies concentrated on *physical capital* and 6% on *financial capital* while focusing on tangible resources, whereas

[273] Cf. De Carolis/Deeds (1999); Hoopes/Postrel (1999); Schroeder et al. (2002); Berman et al. (2002); De Carolis (2003); Carmeli/Tishler (2004a+b); Markman et al. (2004); Ray et al. (2004).

[274] In many instances, more than one resource category was explored in a given study. Here, coding was performed for every resource in focus. Studies with no specific resource focus were coded in the category 'resources in general', i.e., studies which measured the impact of *resources in general* on performance.

for the intangible resources 7% concentrated on *routines*, 14% on *intangible assets*, 32% on *capabilities*, and 33% on *human capital*.

Within these resource-categories, authors assigned resource-based logic to various resources. For instance, capabilities comprise, among others, technological capabilities,[275] manufacturing capabilities,[276] marketing capabilities,[277] and organizational capabilities.[278] Researchers concentrating on intangible assets evaluate, among others, networks,[279] reputation,[280] or culture.[281] Additionally, human capital resources attend, for example, to CEOs, TMTs, as well as managers, concerning their skills, experiences, modes of operation, and their decision characteristics,[282] as well as on HRM practices[283] and HR skills in general.[284] Looking at these examples, it seems researchers do broaden their perception of resource-based logic in terms of focusing on diversified resources, and hence accept a rather extended resource definition, i.e., resources which are tied semi-permanently to the firm, such as human resources. In other words, researchers *do* apply resource-based logic to any resource, determining its value from the market context within which the resource is to be applied.[285]

[275] Cf. De Carolis (2003); Spanos/Lioukas (2001); Tripsas (1997).
[276] Cf. Bates/Flynn (1995); Christmann (2000); Schroeder et al. (2002).
[277] Cf. De Carolis (2003); Spanos/Lioukas (2001).
[278] Cf. Kraatz/Zajac (2001); De Saá-Pérez/García-Falcón (2002); Spanos/Lioukas (2001).
[279] Cf. Borch et al. (1999); Gulati (1999); McEvily/Zaheer (1999).
[280] Cf. Carmeli/Tishler (2004a+b); Combs/Ketchen (1999); Deephouse (2000); Rao (1994).
[281] Cf. Carmeli/Tishler (2004a+b); Chan et al. (2004); Zahra et al. (2004).
[282] Cf. Bergh (2001); Combs/Ketchen (1999); Roth (1995).
[283] Cf. Delaney/Huselid (1996); Harel/Tzafir (1999); Khatri (2000); Koch/McGrath (1996).
[284] Cf. Bennett et al. (1998); Combs/Ketchen (1999); McGrath et al. (1995).
[285] Accordingly, researchers adopt a rather extended resource definition as outlined in chapter 2.3.3.1.

Resource-Types*	# of Tests	% of Tests
Tangible	**32**	**15%**
Intangible	**159**	**72%**
Resources in General	**30**	**13%**
Resource-Categories*	**# of Tests**	**% of Tests**
Physical Capital	**23**	**8%**
Technology	17	-
Others	6	-
Financial Capital	**16**	**6%**
Routines	**20**	**7%**
Static Routines	9	-
Dynamic Routines	11	-
Intangible Assets	**39**	**14%**
Patents	4	-
Networks	8	-
Reputation	13	-
Brand Name	3	-
Culture	6	-
In General	5	-
Capabilities	**86**	**32%**
Technological Capabilities	17	-
Manufacturing Capabilities	8	-
R&D Capabilities	9	-
Marketing Capabilities	12	-
Learning Capabilities	7	-
Organizational Capabilities	13	-
Competitive Capabilities	7	-
Alliance Capabilities	4	-
Others	9	-
Human Capital	**88**	**33%**
CEO and TMT	19	-
HRM Practices	16	-
HR Skills & Knowledge	53	-
* Note that one study can be allotted to more than one category and sub-category.		

Table 6: Resource Types and Categories within Empirical Tests of RBT

While coding the resource-categories, it was rather difficult to distinguish between the different ***resource-perspectives*** as outlined in chapter 2.3.3.1. Whether researchers argued the value of a *unique resource* (the stand-alone resource perspective) or a *resource-bundle* (the resource-combination perspective) was hard to reveal, unless researchers explicitly defined their resource in this regard.

For example, Coff (1999) argues that knowledge exists on different levels such as the group, organization, or network level and is thus most likely to be bundled with other resources.[286] Yet, Coff explicitly outlines that he is focusing only on *human capital* within his study: "That is, although knowledge may be embedded in routines, information systems, or networks [...], I

[286] Cf. Coff (1999), p. 144.

will focus specifically on knowledge that employees carry home with them each day."[287] Focusing on a resource-bundle, Dutta et al. (2003) define a firm's pricing capability as the ability to set the right price, based on many complementary resources such as routines, skills, and systems.[288] Miller and Shamsie (1996), in this connection, distinguish between discrete resources and bundled, so-called systemic resources within their empirical study. They argue that discrete resources have value on their own and are more or less independent of their organizational context (e.g., technical skills, exclusive contracts), whereas systemic resources have value due to being part of a system or network (e.g., specific team-skills within a well-coordinate team).[289] However, about 60% of the studies did not provide such a detailed definition, and it is open for the reader's better judgment to decide whether the value of the resource under investigation is based upon one single resource or on a bundle of resources.

Regarding the four resource conditions argued within the central propositions, overall, only about 65% of the 192 studies operationalized one or more of these conditions. The remaining 35% of the studies did not explicitly operationalize the value, rareness, inimitability, and non-substitutability of resources. Instead, they included variables which represent the stock of resources in general, or variables to represent a specific conduct which is based on certain resources.[290]

For each of the four resource conditions, Table 7 depicts the number and percentage of articles that *statistically* test the respective condition (STAT) as well as *argumentatively* assess the respective condition (ARG). Whereas the former implies that this condition has been operationalized in some way, the latter refers to a mere argumentative assessment and description of the respective resource condition in general or for a specific context situation in particular. Additionally, Table 7 outlines whether the studies used proxies (accessible secondary data) or constructs (primary data collection through field research, while using questionnaires, interviews, etc.) to operationalize the resource conditions.

[287] Coff (1999), p. 145.
[288] Cf. Dutta et al. (2003), p. 619.
[289] Cf. Miller/Shamsie (1996), p. 523.
[290] Cf. Hansen/Wernerfelt (1989); Hitt et al. (1997); Jiang/Beamish (2004); Robins/Wiersema (1995).

Operationalizing Resource Conditions*	# of Tests			% of Tests	
	STAT	ARG	SUM	STAT	Overall
Value	**108**	**23**	**131**	**81%**	**47%**
Proxy**	36	-	-	-	-
Construct***	72	-	-	-	-
Rareness	**6**	**48**	**54**	**5%**	**20%**
Proxy**	2	-	-	-	-
Construct***	4	-	-	-	-
Inimitability	**16**	**44**	**60**	**11%**	**22%**
Proxy**	4	-	-	-	-
Construct***	12	-	-	-	-
Non-Substitutability	**4**	**27**	**31**	**3%**	**11%**
Proxy**	3	-	-	-	-
Construct***	1	-	-	-	-

* Note that one study can be allotted to more than one category.
** Single vs. multiple proxies: V (66%/34%); R, I, NS (100%/0%).
*** Insider vs. outsider information: V (9%/91%); R (98%/2%); I, NS (100%/0%).

Table 7: Operationalizing Resource Conditions within Empirical Tests of RBT

As can be seen in Table 7, ***statistically***, the resource condition investigated most repeatedly is the *value* of a resource (81%), while 35% are using proxies and 65% constructs in this connection. Concerning proxies, about 66% of the researches use several proxies, whereas 34% rely on just one proxy to reflect the value of a resource. In using constructs, researchers tend to just focus on inside information to gather the data needed (91%), instead of including an outside perspective (9%), e.g., industry experts, consultants, etc.[291] Yet, following Rouse and Daellenbach (2002) who, on the one hand emphasize the importance of research *in* organizations, to be able to distinguish between "know-what" vs. "know-how", on the other hand also call for complementary research *on* organizations. The authors assert that outsiders might observe effects that insiders have so taken for granted that they cannot discover them for themselves.[292]

As to the other three characteristics, about 11% of these studies controlled for *inimitable* resources, 30% using proxies and 70% constructs. On the subject of rareness and non-substitutability, even less effort could be found in exploring these two resource characteristics. Merely 5% of the studies operationalized the *rareness* of a resource and only 3% accounted for the *non-substitutability* of a resource. The ratio of using proxies compared to constructs is 30% to 70% for both resource characteristics, whereas all studies relied solely on single proxies and insider information.

[291] For example, Douglas and Ryman (2003) examine the drivers of competitive advantage within the hospital industry, concentrating among others on firm-specific competencies. In order to evaluate the hospital and physician group resource endowments with regard to their relative strategic value, they utilized highly qualified industry experts. Cf. Douglas/Ryman (2003), p. 338.
[292] Cf. Rouse/Daellenbach (2002), p. 964.

Furthermore, Table 7 shows that while the rareness, inimitability, and non-substitutability conditions have rarely been operationalized and tested statistically, many studies assessed them ***argumentatively***. For instance, De Saá-Pérez and García-Falcón (2004) argumentatively assess that human resources meet "…the RBV conditions for being a source of competitive advantage. We can say that HR adds value to the organisation because people differ in their capacities and abilities, and therefore, in their contribution to the firm. HR are rare because it is difficult to find people who guarantee high performance levels in the organization due to the labour market's heterogeneity. Their inimitability emerges from the difficulty in duplicating people's knowledge, abilities, experience and behaviour, at least in the short term. Moreover, the high transaction costs that people recruitment would involve can be a significant obstacle to their mobility or acquisition. Finally, people are a resource non-substitutable because not everybody has the same capacity to adapt to the different environments and technologies, and those who are able to create value in one context are unable to do so in others."[293] Bharadwaj (2000) operationalizes the value of IT-capabilities (the measure was derived from IT leaders' ranking by industry experts) and argues the rareness and inimitability of the different resource conditions for IT capabilities, i.e., IT infrastructure, human IT skills, and its ability to leverage IT for intangible benefits.[294] Similarly, Powell and Dent-Micallef (1997) assess the impact of IT resources on performance. The authors argue that IT advantage depends upon exploiting relationships among complementary organizational resources such as human resources (open organization and communications, organizational consensus and flexibility, CEO commitment, and IT-strategy integration) and business resources (supplier relationships, IT training, business process design, team orientation, benchmarking, and IT planning), and asses the strategic potential of IT regarding value, rareness, and its inimitability, yet, only operationalize the value condition.[295] Finally, Deephouse (2000) assesses media reputation as a strategic resource by arguing that this resource is valuable, rare, inimitable, and non-substitutable, whereas statistically only testing the value of this resource. In doing so, Deephouse emphasizes a two-step process for testing strategic resources: *first*, identify potential resources and theoretically analyze their strategic potentials and *second*, measure the proposed resources and assess their (positive) impact on performance.[296] Similar contributions to the approach of Deephouse can

[293] De Saá-Pérez/Gárcia-Falcón (2004), p. 54.
[294] Cf. Bharadwaj (2000), p. 176.
[295] Cf. Powell/Dent-Michallef (1997), p. 379f.
[296] Cf. Deephouse (2000), p. 1092f.

be found within the papers of Bergh (2001), Daily et al. (2000), Huselid (1995), Richard (2000), and Segev et al. (1999).

The following tables 6-9 outline a variety of examples on the operationalization of valuable, rare, inimitable, and non-substitutable resources, by categorizing them according to their resource type, resource category, and measure-types (i.e., proxies or constructs). These examples will be used afterwards to identify and conclude on explicit parameterizations for resources and their conditions.

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Tangible	**Physical Capital**	Construct	***Farjoun (1998):*** *physical assets* = comparison through physical base categorization, i.e., items on similarities in raw materials, physical production processes, etc.;
		Proxy	***Lewis (2002):*** *service technologies* = categorization of technological resource inputs for which open markets exist (i.e. off-the-shelf PC technology and software);
		Proxy	***Miller & Shamsie (1996):*** *property-based resources* = theaters (buildings) controlled by each film studio;
		Construct	***Powell & Dent-Micallef (1997):*** *technology resources* = categorization "in-store" (i.e., scanning devices, inventory management technologies, automated administration, automated HR administration, energy management technology, store communication, marketing technology) and "beyond-store" (i.e., home office communication, distribution center inventory management, distribution center communications, EDI, home-office marketing);
		Construct	***Ray, Barney, & Muhanna (2004):*** *technology resources* in customer service = a 6-item scale measuring the range and scope of the technology resources/applications deployed to support CS: 1. scanning/imaging technology 2. network with agents/brokers; 3. web-enabled customer interaction; 4. call tracking/customer relationship management system; 5. computer telephony integration (CTI); 6. customer service expert/knowledge-based system;
	Financial Capital	Proxy	***Chatterjee & Singh (1999):*** *financial resources* = leverage (ratio of long-term debt to market value); current ratio (ratio of current assets to current liabilities);
		Proxy	***Combs & Ketchen (1999):*** *slack capital* = highly liquid, existing capital that is available for immediate investment; measured as cash and marketable securities divided by the number of outlets in the chain;
		Proxy	***Helfat (1997):*** *financial resources* (profit) = total firm pre-tax operating income divided by firm sales (1 year lag);
		Proxy	***Kraatz & Zajac (2001):*** college's *financial assets* = annual market value or a college's endowment;
		Construct	***Ray, Barney, & Muhanna (2004):*** *investment* in customer service = 2 items: 1. What is the annual budget of the customer service unit? (in millions); 2. What is your annual IT budget? (in millions);
Intangible	**Routines**	Construct	***Borch, Huse, & Senneseth (1999):*** *formal administrative governance systems* = items on the importance of the board's advisory roles, networking roles, and regular preparation of written strategies (to reflect organizational resources, i.e., structure and routines);
		Construct	***Carmeli & Tishler (2004a):*** *internal auditing* (routine) = this measure was based on the model developed by Eden and Moriah (1996); includes four aspects of the auditing system: teaching, motivating, deterrence, and process improvement; a sample item is 'the internal auditing prevents inappropriate actions';

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Routines**	Construct	***Carmeli & Tishler (2004b):*** *internal auditing* (routine) = see Carmeli & Tishler (2004a); 6 items that cover 4 aspects of the auditing system: teaching, motivating, deterrence, and process improvement: 1. The internal auditing helps to a better functioning of the organizational members. 2. The internal auditing clarifies aspects of working processes. 3. The internal auditing is perceived as a threat to the position and status of the employees' (R). 4. Organizational members are not afraid of the results revealed by the internal auditing. 5. The internal auditing prevents inappropriate actions which may harm the organization. 6. The internal auditing helps to achieve the organizational goals.
		Proxy	***De Carolis (2003):*** *regulatory competence* (routines) = number of new drugs per year per firm (represents the competence for effectively dealing with the FDA);
		Construct	***Hui (2004):*** *production processes* = unraveling the value of a key product's core supply processes (goods-in, production, and customer delivery) with TBPM technique (time-based process mapping)
		Construct	***Knott (2003):*** *routines* = identification of 20 discrete franchise practices in the survey; agreement that each practice is valuable (captures differences in interpreting the obtained information);
		Proxy	***Pisano (1994):*** *learning* strategy within *production process* = number of person-hours invested in each process development project phase; a high percentage of project resources expended during the process research phase indicates that the organization is focusing its efforts on laboratory-based learning and small-scale experiments;
		Construct	***Powell (1995):*** *TQM process* = 47 items covering 12 variables (executive commitment, adopting the philosophy, closer to customers, closer to suppliers, benchmarking, training, open organization, employee empowerment, zero-defects mentality, flexible manufacturing, process improvement, measurement);
		Construct	***Ray, Barney, & Muhanna (2004):*** *service climate* (customer service routines) = a 4-item scale: 1. customer service representatives are adequately trained to handle different situations that are likely to arise in the customer service function; 2. there is open communication and teamwork in the customer service unit; 3. there is coordination between internal departments to provide quality customer service; 4. the policies and procedures in the customer service unit make it easy to deliver excellent customer service;
	Intangible Assets (Reputation)	Construct	***Carmeli & Tishler (2004a):*** perceived *organizational reputation* = the items of this measure are based on Fortune's America's Most Admired Corporations index, compiled from an annual survey asking 8000 top executives, outside directors, and financial analysts to rate the ten largest companies in their own industry on eight attributes, using a scale of 0 (poor) to 10 (excellent); CEOs were asked to rate their companies on the eight attributes such as innovativeness and use of firm's assets;

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Intangible Assets (Reputation)**	Construct	***Carmeli & Tishler (2004b):*** perceived *organizational reputation* = two measures established by a city reputation survey (items such as: flexible and high-quality manpower; accessibility to markets; favorable attitude toward businesses; fine public education system; comfortable flying service to major cities; low cost of housing; jobs; facilities, taxes, and quality of life) and the reputation survey of Fortune magazine (managers were asked to rate the 10 largest companies in their own industry on eight attributes (attributes were: quality of management, quality of products or services, innovativeness, long-term investment value, financial soundness, ability to attract, develop and keep talented people, community and environmental responsibility, and use of corporate assets)); items used: 1. The quality of management of my local authority is credited with a very favorable reputation. 2. The ability of my local authority to attract, develop, and keep talented people is credited with a very favorable reputation. 3. The quality of services my local authority supplies is credited with a very favorable reputation. 4. The financial soundness of my local authority is credited with a very favorable reputation. 5. In my local authority, the education system is credited with a very favorable reputation. 6. In my local authority, the municipal facilities are credited with a very favorable reputation. 7. In my local authority, the tax system is credited with a very favorable reputation. 8. In my local authority, the transportation system is credited with a very favorable reputation. 9. The quality of life in my local authority's jurisdiction is credited with a very favorable reputation.
		Construct	***Combs & Ketchen (1999):*** *brand name reputation* = four items on the expert panel survey: Comparing this company to all other food service operations, 1. How well respected is this company? 2. How good of a value is this company perceived to provide for the price? 3. How strong is this company's reputation for consistent quality and service? 4. How strong is this company's brand name recognition in its service area?
		Proxy	***Deephouse (2000)*** **:** *media reputation* = measured through content analyses of news papers, using common practice in media research; rated as favorable, unfavorable, neutral;
		Proxy	***Kotha, Rindova, & Rothaermel (2001):*** *reputation* = media visibility (value derives from the reduced uncertainty for other market participants about the reliability, trustworthiness, and quality of a particular firm);
		Proxy	***Kraatz & Zajac (2001):*** *college reputation* = two independent time-varying measures: percentage of out-of-state enrollment, which captures the breadth of a college's renown and the extent to which it has national drawing power; percentage of applicants rejected in any given year, which captures the depth, or strength of reputation;
		Proxy	***Morris (1997):*** *reputation* = EPA violations (Environmental Protection Agency);
		Proxy	***Rao (1994):*** *reputation* = contest winner awarded with the first price in an event in the automotive industry;

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Intangible Assets (Networks)**	Construct	***Borch, Huse, & Senneseth (1999):*** *organizational networks* = items on the use of the networks of the employees as information source, the use of the manager's own networks, the use of networks to influence the environment, and the use of network as a knowledge resource;
		Proxy	***Gulati (1999):*** *network resources* = extent of information accessible to firms from their position in the network through measures of centrality, i.e., 'cliques' capture the number of cliques to which a firm belongs; 'closeness' captures how closely connected a firm is to the rest of the firms in the inter-firm network (directly and indirectly);
		Proxy	***Kraatz & Zajac (2001):*** *network relationships* = external support relationships (measured in terms of a college's philanthropic support in a given year, e.g., financial support from alumni, parents, etc.);
		Construct	***McEvily & Zaheer (1999):*** *network resources' interactions* = infrequency of interaction (measures the rarity of interaction with advisors in terms of the number of conversations per month), geographic dispersion (travel time by car to each advisor's office), non-redundancy (asks respondents to identify the five most important external sources of advice relied upon and to report the extent to which these five sources do know each other), participation in regional institutions (indicates the extent to which a firm uses the services available from a regional industrial extension center);
	Intangible Assets (Culture)	Construct	***Carmeli & Tishler (2004a):*** *organizational culture* = this measure is based on Denison's (1990) organizational culture model, which includes four hypotheses. (1) involvement hypothesis: organizational effectiveness is a function of the level of involvement and participation of the organization's members; (2) consistency hypothesis: organizational effectiveness is a function of the degree to which the organization's members understand and hold a shared system of beliefs, values, and symbols; (3) adaptability hypothesis: organizational effectiveness is a function of the organization's ability to perceive the external and internal environment and respond to it through a re-institutionalization of a set of behaviors and processes; (4) mission hypothesis: organizational effectiveness is a function of the degree to which the organization's members hold a shared definition of the function and purpose of the organization and its members;
		Construct	***Carmeli & Tishler (2004b):*** *organizational culture* = (see Carmeli & Tishler (2004a)); 8 items: 1. There is a high involvement of the employees in the processes, decisions, and their implementation. 2. The employees are committed and hold a high sense of responsibility to the organization. 3. All have a common set of values, creeds, and symbols. 4. There is a high coordination and agreement among the employees. 5. The organization knows the external environment and provides appropriate responses. 6. The organization adapts its structure and the way it functions to changes in the external environment. 7. The organizational goals are clear and agreeable to all members. 8. The organization strives hard to achieve its goals.

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Intangible Assets (Culture)**	Construct	***Chan, Shaffer, & Snape (2004):*** *organizational culture* = measured with twenty-one items based on the four cultural subscales developed by Denison and Mishra (1995) and one additional scale, i.e., involvement, member conformity, policy consistency, adaptability and mission;
		Construct	***Zahra, Hayton, & Salvato (2004):*** *organizational culture* = five dimensions: individual orientation, external orientation, decentralization, financial controls, and strategic controls; items: *Individual vs. Group Cultural Orientation* – this company values 1. being a team player; 2. consensus in making key decisions; 3. tying pay to group performance; 4. rewarding performance based on individual achievement (R). *External vs. Internal Cultural Orientation* – this company 1. tracks changes in its markets on a regular basis; 2. values working with key customers and learning from them; 3. values working with key suppliers and learning from them; 4. values learning from the actions of its competitors; 5. resists ideas that were developed by other companies or groups (R). *Assumptions Concerning Centralized versus Decentralized Control* – this company 1. is open to change; 2. encourages employees to challenge the status quo; 3. is decentralized in its decision making; 4. maintains open communication channels in its operations. *Strategic vs. Financial Cultural Orientation* *1. Financial Controls* (To what extent are the following used in managing and evaluating your company's performance? Cash flow; Return on investment; Objective criteria, such as return on assets; Formal performance appraisal) and *2. Strategic Controls* (To what extent are the following used in managing and evaluating your company's performance? Formal face-to-face meetings among managers to discuss company performance; Informal face-to-face meetings among managers to evaluate company goal achievements; Evaluating company performance against subjective criteria such as customer satisfaction);
	Capabilities (Technological)	Proxy	***De Carolis (2003)*** **:** *technological competence* = company A had issued "N" number of patents during a given year; within 2 years of their issue date, "M" patents had cited these "N" patents; of these "M" citations, "X" patents belonged to Company A (self-citing); the ratio of X/N is the measure used for technological competence;

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Capabilities (Technological)**	Construct	***Schilling & Steensma (2002)*** **:** *technological capabilities* = commercial uncertainty (items that assess the degree to which managers were confident that the technology would meet technical and/or commercial expectations); dynamism (items on length of time the technology is expected to be valuable or the length of its life cycle); potential for sustainable advantage (items that captured the degree to which managers felt that the technology would differentiate the firm, or the degree to which managers felt that competitors would be able to reap similar strategic benefits within a short period of time);
		Construct	***Spanos & Lioukas (2001):*** *technical capabilities* = parallel Leonhard-Barton's (1995) technical systems, and Lado et al.'s (1992) transformation-based competencies, referring to those competencies that are required to converting inputs into outputs (three items: efficient production department, technological capabilities and infrastructure, and economies of scale and technical experience);
		Proxy	***Tripsas (1997):*** *technological capabilities* = technical experience, i.e., incumbent (dummy variable set equal to one if a firm was present in the prior generation), stock of prior experience (the number of years of experience a firm has in the prior generation of technology);
	Capabilities (Organizational)	Proxy	***Kraatz & Zajac (2001)*** **:** *organizational capabilities* (experience) = organizational age;
		Construct	***Lee & Miller (1999):*** *OCE (organization's commitment to its employees) capabilities* = (1) items assessed how much the organization cares about employee well-being, about ample and fair play, about satisfaction at work, and about sharing profits; (2) CEO had to rate his organization relative to its principal competitors on how much the company invested in education and competence development for its employees, and how much the company invested in total compensation, including benefits and vacation, for its employees;
		Proxy	***Miller & Shamsie (1996)*** **:** *knowledge-based organizational resources* (capabilities) = (a) expertise of the film studios, e.g., script development, set design, direction, etc, measured through Academy Awards that a studio won each year and (b) team, coordinative, or integrative ability measured by a studio's former investments in complex, large-scale film projects because these projects require the management of many talents and resources;
		Construct	***De Saá-Pérez & García-Falcón (2002):*** *organizational capabilities* = multi-item scale based on Lado and Wilson's (1994) work; factors from factor analysis (explaining 87,5% of total variance) – output-based capabilities (good relationship with clients, suppliers, public institutions, etc.; good corporate image); managerial capabilities (degree of commitment and involvement of personnel; importance of HR aspects in strategic decisions); input-based capabilities (training of firm-specific human capital; incentives and motivation of specific human capital); and transformational capabilities (encouraging creative and innovative ability in the employees);
		Construct	***Spanos & Lioukas (2001):*** *organizational capabilities* = denote Teece et al.'s (1997) organizational and managerial processes encompassing managerial competencies, knowledge and skills of employees together with efficient organizational structure, organizational culture, efficient coordinative mechanisms, strategic planning procedures, and ability to attract creative employees;

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Capabilities (Marketing)**	Proxy	***De Carolis (2003)*** **:** *marketing competence* = relative advertising expenditures (total advertising expenditures divided by total sales for a given year);
		Construct	***Spanos & Lioukas (2001):*** *marketing capabilities* = resemble Lado et al.'s (1992) output-based competencies, measured with items such as building of privileged relationships with customers and suppliers, market knowledge, control over distribution channels, and strong "installed" customer base;
	Capabilities (Manufacturing)	Proxy	***Bates & Flynn (1995):*** *innovative manufacturing capability* = count of seven manufacturing innovations (i.e., TQM, JIT, cellular manufacturing, supplier reduction programs, employee involvement programs, computer aided design (CAS/CAM), manufacturing strategy);
		Construct	***Christmann (2000):*** *manufacturing capabilities* = 5 items; relative to our major competitors that manufacture in the US, we focus on: 1. being the first in the industry to try new methods and technologies 2. using the latest technology in production 3. capital investment in new equipment and machinery and relative to our major competitors that manufacture in the US, we: 1. have been leaders in introduction of product innovations over the last three years 2. have been leaders in introduction of process innovations over the last three years;
		Construct	***Schroeder, Bates, & Junttila (2002):*** *manufacturing capability* = 3 sub-scales: *process and equipment* 1. we have equipment which is protected by the firm's patents; 2. proprietary equipment helps us gain a competitive advantage; 3. how does the process technology at your plant compare to industry competition on a global basis; 4. what term does describe your production equipment relative to your industry (state-of the art to poor); *internal learning* 1. employees are cross-trained at this plant so that they can fill in for others if necessary; 2. employees receive training to perform multiple tasks; 3. management takes all product and process improvement suggestions seriously; 4. many useful suggestions are implemented at this plant; *external learning* 1. we strive to establish long-term relationships with suppliers; 2. we maintain close communication with suppliers about quality considerations and design changes; 3. our customers give us feedback on quality and delivery performance; 4. our customers are actively involved in the product design process;

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Capabilities (Others)**	Proxy	***Gulati (1999):*** a firm's *alliance formation capabilities* = experience (number of past alliances a firm has formed), diversity of alliance experience;
		Construct	***Hart & Banbury (1994):*** *strategy making process capabilities* = 5 sub-scales: *1. command* (3 items – CEO sets strategy; CEO determines vision; CEO makes & executes strategy), *2. symbolic* (3 items – challenge our people; 20 year corporate dream; personal example), *3. rational* (4 items – written strategic plan; formal procedure; written mission statement; formal analysis), *4. transactive* (4 items – strategy is iterative; ongoing planning involving all; people have input; market feedback), *5. generative* (3 items – people willing to take risk; experiments encouraged; employees understand);
		Construct	***Judge & Douglas (1998):*** *environmental issues integration capability* = 4 items: 1. environmental issues are explicitly considered within the company's strategic planning process; 2. consideration for the natural environment is addressed within the company's mission statement or statement of business principles; 3. when environmental issues are considered within the strategic planning process, the top management team makes proactive, forward thinking decisions; 4. environmental personnel participate influentially in the company's strategic planning process;
		Construct	***McEvily & Zaheer (1999):*** *competitive capabilities* = 3 sub-scales: *pollution prevention capabilities* 1. substitute less hazardous raw materials for more hazardous ones; 2. offer new products/services because of low waste disposal costs; 3. discontinue products/services high in environmental management costs; *competitive scanning capabilities* 1. monitor your competitors' strategies and tactics; 2. search for information about which customers your competitors supply; 3. collect information about your competitors' market share; *quality management capabilities* 1. collect data on your company's production process variations; 2. provide charts and graphs to production employees reporting defect rates; 3. conduct experiments to isolate causes of defects
		Proxy	***Sakakibara (2002):*** *R&D capabilities* = the difference between a firm's R&D intensity (R&D expenditure/sales) and the R&D intensity of the industry to which the firm belongs;

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Human Capital (Management)**	Proxy	***Bergh (2001):*** *top management knowledge* = organizational tenure, i.e., mean number of years each of the acquired company top executives had been employed at the time of the acquisition (this measure reflects exposure to the organization, its culture, strategy, processes, systems and critical events, factors that would affect an executive's knowledge of the company, its history and policies);
		Construct	***Carmeli & Tishler (2004a):*** *managerial skills* = this measure consists of the nine managerial skills identified by Yukl (1981; 70) as characteristic of successful leaders; examples are cleverness, conceptual skills, and social skills;
		Construct	***Carmeli & Tishler (2004b):*** *managerial capabilities* = 12 items: 1. Attracting and retaining well-trained and competent top managers 2. Achieving a better overall control of general organization performance 3. Perceiving new organizational opportunities and potential threats 4. Developing and communicating a unified sense of direction and a sense of common purpose to which all members of the organization can relate 5. Unifying conflicting opinions, improve coordination and enhance effective collaboration between key executives, generate enthusiasm, and motivate sufficient managerial drive for better performance 6. Developing a more effective organization wide strategic planning system for planned overall organizational development 7. Generating advanced developmental and training programs for our organizational members 8. Increased use of management by objective 9. Increased use of 'financial accountability' 10. Increased participative decision making at senior and middle management levels 11. An extensive and effective use of quantitative techniques in decision making 12. An extensive use of cost-effective analyses
		Construct	***Chandler & Hanks (1994):*** *entrepreneurial competence* = measured by a 6-item scale: 1. I accurately perceive unmet consumer needs; 2. I spend considerable time and energy looking for products or services that will provide real benefits for my customers; 3. One of my greatest strengths is identifying goods and services people want; 4. One of my greatest strengths is my ability to seize high-quality business opportunities; 5. I have an extremely strong internal drive to see this venture through to fruition; 6. One of my greatest strengths is my ability to develop goods and services that are technically superior;
		Proxy	***Combs & Ketchen (1999):*** *TMT experience* = number of years on the job and in the firm of inside directors;

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Human Capital (Management)**	Construct	***Chandler & Hanks (1994):*** *managerial competence* = measured using a 6-item scale: 1. I make resource allocation decisions that achieve maximum results; 2. One of my greatest strengths is achieving results by organizing and motivating people; 3. One of my greatest strengths is organizing resources and coordinating tasks; 4. One of my greatest strengths is my ability to supervise, influence, and lead people; 5. One of my greatest strengths is my ability to delegate effectively; and 6. One of my greatest strengths is my ability to keep this organization running smoothly;
		Proxy	***Daily, Certo, & Dalton (2000):*** *CEO international experience* = the number of international assignments and total years in such assignments; tenure (the number of years in which the CEO has served in his of her current position); succession (whether the CEO was employed by the focal firm immediately prior to his or her promotion to CEO (inside) or by another firm (outside));
		Proxy	***McGee, Dowling, & Megginson (1995):*** *management experience* = number of years of marketing, technical, production experience;
		Construct	***Roth (1995):*** *CEO characteristics* =international interdependence, problem-solving style, functional experience (production, engineering, R&D, marketing and sales, general management, finance, accounting, law), international background;
		Construct	***Wiklund & Shepherd (2003):*** *CEO entrepreneurial competence* = 9 items, focusing on the willingness to be innovative, proactive, and take risks;
	Human Capital (HR skills & knowledge)	Construct	***Bennett, Ketchen, & Schultz (1998)*** **:** *employees as strategic resources* = 4 items, e.g., 'management views its employees primarily as a cost of doing business', 'management views its employees as a key factor to our success', etc.;
		Construct	***Carmeli & Tishler (2004a):*** *human capital* = this measure has three dimensions: education, work experience, and competence of the firm's members; CEOs were asked to respond to four items relating to education and work experience and eight items relating to competence; a sample item is 'In my company, employees have suitable education to fulfill their jobs';
		Proxy	***Coff (2002)*** **:** *industry human resource capital intensity* = index made up of 3 measures: education (years of schooling), professionals (% of the target's industry employment that is made up of doctors, engineers, lawyers, managers, mathematical scientists, and social scientists), and training (# of hours of formal and informal training);
		Proxy	***Kraatz & Zajac (2001):*** *human resources* = average salary of a college's faculty, percentage of faculty who were full professors;
		Proxy	***Maijoor & Witteloostuijn (1996):*** *human resources* = demand for audit services (number of annual accounts disclosed by public companies, private companies, and cooperatives; and the number of professionals (NIvRA students and RA licensees) in audit practice);

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Human Capital (HR skills & knowledge)**	Construct	***Carmeli & Tishler (2004b):*** *human capital* = three dimensions, i.e., education, work experience, and competence: 1. Employees have suitable education to fulfill their jobs. 2. Employees are well trained. 3. Employees hold suitable work experience for accomplishing their job successfully. 4. Employees are well-skilled professionally to accomplish their job successfully. 5. No one knows this job better than our employees. 6. Problems here are easy to solve once the employees understand the various consequences of their actions, a skill they have acquired. 7. Employees do not know why, but sometimes when they are supposed to be in control they feel they are being manipulated (reverse-scored item). 8. If anyone here can find the answer, it is our employees. 9. Employees go home, feeling they have not accomplished much (reverse-scored item). 10. Considering the time spent on the job, employees feel thoroughly familiar with their tasks. 11. Doing this job well is a reward in itself. 12. Mastering their jobs means a lot to our employees.
		Construct	***McGrath, Tsai, Venkataraman, & MacMillan (1996):*** *HR team* = two sub-scales: *1. team causal understanding* = team's understanding of revenues or funds, identity of key customers or clients, customer needs, competition faced, usage patterns, risks to customers, pricing issues, legal and regulatory issues, risks to the firm, support services required, costs of resources, key operational requirements, threats to reliability, threats to quality, costs, bottlenecks; *2. team proficiency* = others know what to do, others are competent, people can depend on one another, people know what information is important to others, evidence of hidden agendas, information is held up or get distorted, new people are easily assimilated, people understand one another, will implement decisions, information is not available, team is short of key skills, people resist challenging one another;
		Construct	***Ray, Barney, & Muhanna (2004):*** *managerial IT knowledge* = a 4-item scale measuring the responses to the following statements concerning the degree of shared knowledge and understanding between CS and IT managers: 1. managers in the information systems unit understand the business operations of the customer service unit; 2. there is a common understanding between managers in customer service and information systems units regarding how to use information technology to improve customer service; 3. managers in the customer service unit recognize the potential of IT as a tool to increase the productivity (efficiency) of the customer service representatives; 4. there is a common understanding between managers in the information systems and customer service units regarding how to use IT to improve customer service);

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Human Capital (HR skills & knowledge)**	Construct	***Welbourne & Andrews (1996):*** *human resource value* = assesses the degree to which a company values its employees as a specialized asset: 1. the company's strategy and mission statements cited employees as a competitive advantage; 2. a training program for employees was mentioned, indicating allocation of resources that resulted in employees obtaining company-specific education; 3. an officer with responsibility for human resource management was present 4. full-time employees, rather than temporary or contract employees were regularly used 5. the SEC requires employers to rate their employee relations climate;
		Construct	***Wiklund & Shepherd (2003):*** *organizational knowledge* = 11 items pertaining to market and technological knowledge: Compared to other companies in your industry, does your company have a weak or strong position in terms of: 1. staff with a positive commitment to the company's development, 2. technical expertise, 3. expertise regarding development of products or services, 4. highly productive staff, 5. expertise in marketing, 6. special expertise regarding customer service, 7. special expertise regarding management, 8. innovative markets, 9. staff educated in giving superior customer service, 10. staff who like to contribute with ideas for new products/services, 11. and staff capable of marketing your products/services well;
		Construct	***Wright, McMahan, McCormick, & Sherman (1998):*** *HR core competence* = 3 sub-scales: *1. skilled employees* (two items: attracting and retaining competent employees; developing necessary skills among employees), *2. efficient production* (two items: developing efficient production processes; improving employee motivation and morale), *3. new business development* (three items: securing new business contracts; perceiving new market opportunities and threats; developing new products);

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Human Capital (HRM practices)**	Construct	***Chan, Shaffer, & Snape (2004):*** *human capital management capabilities* = high-performance human resource (HPHR) practices were measured with a scale based on items developed by Huselid (1995), resulting in two factors, i.e., 'employee skills and organizational structure' and 'employee motivation and communication';
		Construct	***Delaney & Huselid (1996):*** *HRM practices* to enhance HR value = five scales: 1. staffing selectivity index (selectivity in hiring and employee training, i.e., the number of applicants considered for each position filled by an organization for three different types of employees); 2. training index (extensiveness of employee training using a 3-item index including a variable indicating whether the organization had provided any formal job training in the past two years; number of employees that had received formal training in that time period, and respondents' view on the overall effectiveness of their training programs); 3. incentive compensation (respondents' perceptions of how important job performance is in determining the earnings of the three primary employee groups; dummy variable indicating the existence of a formal procedure for resolving disputes between employees and supervisors or co-workers (equitable treatment)); 4. decentralized decision making (certain job or work structures allow skilled and motivated employees to become more involved in determining what work is to be done and how it is to be performed); 5. internal labor market index (captures the existence of opportunities for promotion from within);
		Construct	***Harel & Tzafrir (1999):*** *HRM-practices* = 5 scales: 1. selection (12 items, in which respondents were asked to evaluate the importance attributed by the company to selection tools and tests used in the selection process); 2. training (6 items that asked respondents to indicate the percentage of employees in the organization who received systematic and formal training in the past year in a variety of skills: leadership, business areas, quality, technical aspects of the job, etc.); 3. incentive compensation (4 items to investigate the relationship between the income of job holders in the company to their job performance, as in Delaney and Huselid's study (1996)); 4. employee participation (10 items on participation impact, i.e., the degree of influence of employees on various issues; and 5 items on participation in HRM issues, i.e., the participation on the organizational level at which decisions on HRM are made) 5. internal labor market (3 items that asked respondents to indicate the importance attributed by the organization to its employees as a source of internal recruitment for rank and file employees, professional employees, and managerial positions);
		Construct	***Huselid, Jackson, & Schuler (1997):*** HRM capabilities = professional HRM capabilities (11 items – expertise & skills relevant to performing excellently within a traditional HRM department); business-related capabilities (3 items – amount of business experience HRM staff members have had outside the functional specialty);

VALUE			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Human Capital (HRM practices)**	Construct	***Khatri (2000):*** *HR practices* = 6 sub-scales: *1. recruitment/selection* (four items: use of employment tests, performing validation studies on selection methods/instruments, providing realistic job previews, and conducting structured and standardized interviews), *2. training/development* (five items: employees of the company go through training programs every few years; company has formal training programs to teach new employees skills to perform their jobs; training needs analysis; cost-benefit analysis of training programs; and evaluation of training programs), *3. performance appraisal* (two items: supervisors discussed performance with their subordinates, and appraisal process involved consultation between the supervisor and his or her subordinates), *4. compensation/benefits* (four items: performance in the job as important in determining earnings of employees; promotion based primarily on seniority (reverse-coded); company has comprehensive flexible benefits scheme and; company reviews benefits regularly) and in addition, *5. HR planning* (nine items: HR department as integral part of company's strategic planning process; HR activities aligned with overall corporate strategy; HR department has explicit statement of its mission and goals; HR accorded an important role in the company; HR has as much to say in corporate matters as other departments; HR activities fully integrated with each other; the head of the HR department participates in executive/steering committee meetings; the extent of information flow between HR department and other departments; and the treatment of HR function as a specialized function.) *6. employee participation/involvement* (adopted from Delery and Doty (1996) and included three items: 'employees are allowed *to* make decisions', 'employees are asked to participate in decisions', and 'employees have open communication with supervisors'). ***Koch & McGrath (1996):*** *HRM-practices* = investments in HR planning, hiring, and employee development; ***Richard & Johnson (2001):*** *strategic HRM effectiveness* = items include: employee participation and empowerment; teamwork; workforce planning-flexibility and deployment; advanced issue identification-strategic studies; management and executive development; succession and development planning (managers); workforce productivity and quality of output; and employee and manager communications; ***De Saá-Pérez & García-Falcón (2002):*** *HR practices* = practices included aspects like personnel selection, performance appraisal, incentive compensation etc.; the manner in which candidates were attracted (internal/ external recruitment), the selection criteria used (general//specific knowledge and skills), training and career development, the main characteristics of the pay system, whether or not there was an established system for assessing performance, etc.
		Proxy Construct	
		Construct	

Table 8: Operationalizing Valuable Resources

Rareness:			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Tangible	**Physical Capital**	Construct	***Steensma & Fairbank (1999):*** *rarity of technology* = 4 items: 1. many of our competitors had fundamentally similar technology (R); 2. few credible substitutes competed with this technology; 3. this specific technology was common within the industry (R); 4. there was a limited number of organizations that possessed this technology;
Intangible	**Capabilities (Technological)**	Construct	***Schilling & Steensma (2002) :*** *technological capabilities* = uniqueness of technological know-how, i.e., items that asses the degree to which the technology in question is uncommon in the industry, or the degree to which the competitors had fundamentally similar technology;
	Human Resources	Construct Construct Proxy Proxy	***Bennett, Ketchen, & Schultz (1998) :*** *employees as rare resources* = defined through labor market munificence, several items reflect scarcity of resource, i.e., 'How would you assess the labor supply for this organization overall?'; ***Carmeli (2001), (2004):*** *intangible resources* = interval rating technique for a list of intangible resources according to their rareness; ***Maijoor & Witteloostuijn (1996):*** *rareness of human resources* = degrees of concentration, i.e., Herfindahl-Hirschman indices; ***Vicente-Lorente (2001) :*** *specific human resources* = a factor positively correlated with the proportion of personnel with college studies, technical staff, and training expenses per employee.

Table 9: Operationalization Rare Resources

INIMITABILITY:			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Tangible	**Physical Capital**	Construct	***Borch, Huse, & Senneseth (1999):*** *technology resources* = 2 items: non-imitable products and technology;
		Construct	***Steensma & Fairbank (1999):*** *limited imitability of technology* = 4 items: 1. for another firm to copy this technology would be straightforward (R); 2. the 'reverse engineering' of this technology by a competitor would be technically difficult; 3. it would be easy for other firms to imitate this technology (R); 4. explaining technical details of this technology to the layman would be relatively straightforward (R);
Intangible	**Routines**	Construct	***Knott (2003):*** *routines isolating mechanisms* = knowledge of each of the 20 franchise practices (captures differences in independents' ability to obtain information not intended for release outside the franchise);
	Intangible Assets	Construct	***Carmeli (2001), (2004):*** *intangible resources* = interval rating technique for a list of intangible resources according to their inimitability;
		Proxy	***Markman, Espina, & Phan (2004):*** *patents* = important patents provide monopolistic protection, thus barriers for imitators; importance is operationalized through citation rates (because imitating patents remains illegal, a high citation count suggests that a patent represents a major stumbling block to rivals who seek access to the protected space);
	Capabilities (Technological)	Proxy	***De Carolis (2003)*** **:** *technological competence* = Company A had issued "N" number of patents during a given year; within 2 years of their issue date, "M" patents had cited these "N" patents; of these "M" citations, "Y" patents were by other companies; the ratio Y/N is used for imitability;
		Construct	***McEvily & Chakravarthy (2002):*** *technological capabilities* = 4 sub-scales: *1. resource specificity* – extent to which what a firm knows about product components is specific to a customer, application, or component varieties; *2. design specificity* – specialized architectural knowledge by tailoring its adhesive formulas for individual customers and applications; *3. tacitness* – 'we can predict which varieties of a component and how much to use to improve performance; we can explain why using certain varieties and amounts of component results in specific performance characteristics'; *4. complexity* – product components and the ease of application, open time/set speed; adhesion, stability, strength, aging;
		Construct	***Schilling & Steensma (2002)*** **:** *technological capabilities* = barriers to imitation of technological know-how, i.e., items questioning the perception of imitating or reverse engineering the technology;

INIMITABILITY:			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Capabilities (Manufacturing)**	Construct	***Kogut & Zander (1993):*** *manufacturing capabilities* as inimitable resources = 3 sub-scales: *Codifiability* 1. a useful manual describing our manufacturing process can be written; 2. large parts of our manufacturing control are embodied in standard type software that we modified for our needs; 3. large parts of our manufacturing control are embodied in software developed within our company exclusively for our use; 4. extensive documentation describing critical parts of the manufacturing process exists in our company; *Teachability* 1. new manufacturing personnel can easily learn how to manufacture the product by talking to skilled manufacturing employees; 2. new manufacturing personnel can easily learn how to manufacture our product by studying a complete set of blueprints; 3. educating and training new manufacturing personnel is a quick, easy job; 4. new manufacturing personnel know enough after a normal high school education to manufacture our product; 5. new manufacturing personnel know enough after vocational training to manufacture our product; *Complexity* – How important are the following to manufacturing: 1. processes for changing physical characteristics of a material (e.g., chemical reactions, refinement, heat treatment); 2. processes for changing the shape of material (e.g., casting, pressing, rolling, bending); 3. processes for giving material certain dimensions (e.g., turning, milling, drilling, sawing); 4. processes for assembling different parts to a whole (e.g., welding, soldering, gluing, screwing);

INIMITABILITY:			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Capabilities (Manufacturing)**	Construct	***Zander & Kogut (1995):*** *manufacturing capabilities* as inimitable resources = 6 sub-scales: *Codifiability* – items to capture the extent to which the knowledge could be articulated in documents and software (see Kogut and Zander 1993); *Teachability* – items to capture the ease at the individual level by which knowledge, even when it cannot be formally articulated, can be taught to new workers (see Kogut and Zander 1993); *Complexity* – the number of distinctive skills, or competencies, embraced by an entity or activity; here, multiple competencies used to manufacture a product (see Kogut and Zander 1993); *System dependence* – the extent to which transfer or imitation of a capability is impaired due to dependence on many different (groups of) experienced people for its production; items: 1. It is impossible for anyone in our firm to know everything about the entire manufacturing process; 2. To get high product quality it is very important that our manufacturing personnel has long experience from the specific plant where they are working; 3. Workers in important parts of the manufacturing process have to be in constant contact with engineers or product quality will go down; 4. Our product can be manufactured in a unit isolated from all other production without quality being influenced at all (R); *Product observability* – items concerning whether the manufacturing capability can be acquired by reversed engineering or from published reports; items: 1. A competitor can easily learn how we manufacture our product by analyzing descriptions of our product in product catalogues, etc. 2. A competitor can easily learn how we manufacture our product by taking it apart and examining it carefully; 3. A competitor can easily learn how we manufacture our product by testing in use; *Parallel development* – count of competitors perceived as engaged in parallel efforts aimed at developing a similar product at the time of the innovations' release (to control for the effect of competition on speeding the time to transfer and imitation);

Table 10: Operationalization Inimitable Resources

INIMITABILITY:			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Capabilities (Organizational)**	Construct	***Sharma & Vredenburg (1998):*** *organizational capabilities* = items form case study and RBT characteristics such as causal ambiguity, social complexity, path dependency, among others: 1. they take a long period of time to build up; 2. competitors can not build up these capabilities faster through a greater application of resources; 3. they can not easily be identified or imitated by competitors; 4. they span (provide benefits) to several functional areas/departments; 5. they span (provide benefits) to different levels within the company; 6. they lack a clearly identified owner within the company, i.e., an employee cannot leave with organizational reputation, knowledge, relationships, etc.; 7. they act as triggers for collective learning within the company/innovation within the company/collaborative problem solving with stakeholder; 8. they combine with other assets to generate benefits for the company, e.g., improved reputation combines with an established retail network;
Intangible	**Human Resources**	Construct	***Carmeli (2001):*** *intangible resources* = interval rating technique according to their inimitability;
		Construct	***Combs & Ketchen (1999):*** *specific knowledge* = items: comparing this company to other food services 1. How long would it take to train competent assistant managers? 2. How long would it take to train competent hourly employees? 3. How difficult would it be to communicate job requirements to unit-level managers? 4. How difficult would it be to include all of the unit manager's job tasks in an operations manual?
		Proxy	***Hatch & Dyer (2004):*** *human capital* = inimitability measured through previous experience and turnover;
		Proxy/ Construct	***King & Zeithaml (2001):*** *inimitability of competencies* = (1) linkage ambiguity, i.e., distances derived from all competency factor scores for that industry (seven at the hospital industry, eight at the textile industry); the level of ambiguity was assessed relative to other organizations in the industry and was assessed at two levels: among top managers and among middle managers; (2) characteristic ambiguity, i.e., tacitness and knowledge location (employee knowledge and skill; physical systems such as computer data bases, equipment, and software programs; carefully designed education and incentive systems that support and reinforce knowledge growth; organizational mission, culture, or values that screen and encourage different kinds of knowledge);
		Proxy	***Maijoor & Witteloostuijn (1996):*** *human resources* = inimitability represented by the number of auditors according to the auditors status in the firm (employee, independent, practitioners, and partners), i.e., the ratio of RA employees plus independent RAs to RA partners (a mobility barrier is complemented with a promotion barrier which protects the rent-appropriating capacity of the owners of the firm).

NON-SUBSTITUTABILITY:			
Resource-Type	**Resource-Category**	**Measure**	**Operationalization**
Intangible	**Intangible Assets**	Construct	***Carmeli (2001), (2004):*** *intangible resources* = interval rating technique for a list of intangible resources according to their substitutability;
		Proxy	***Deephouse (2000):*** *reputation* = product-market positions represent bundles of underlying resources (substitutes); includes measures of product market position and tests to see if they attenuate the effect of media reputation on performance;
		Proxy	***Markman, Espina, & Phan (2004):*** *patents* = number of claims listed by each patent (claims define the scope of an invention and distinguish its property from the surrounding technological territory; unlike products (many of which are perfectly substitutable), once a technology space is protected by patent, substitution becomes exceedingly difficult, costly, and time consuming);
Intangible	**Human Resources (HR skills & knowledge)**	Proxy	***Maijoor & Witteloostuijn (1996):*** *human resource skills* = the law prohibits any substitution, since only RAs were allowed to provide audit services during the period of the study; law changes (changes in financial accounting regulation); dummy variable.

Table 11: Operationalization Non-Substitutable Resources

About the ***value*** of a resource and the use of ***proxies***, it seems though, that researchers tend to either rely on *outcome* measures of a particular resource or capability (e.g., number of awards, winning contests, or patents) or on *input* measures (e.g., amount of expenditures, investments, or time) in want of a direct measure. For example, Miller and Shamsie (1996) – analyzing performance differences of US film studios – counted the number of Academy Awards as a proxy to measure the value of organizational capabilities.[297] Similarly, Rao (1994) used the outcome, i.e., the winners of certification contests in the automobile industry, as a proxy for valuable reputation.[298] In analyzing the value of network resources and firm capabilities to determine alliance formation, Gulati (1999) measured alliance capabilities through an experience variable, operationalized by the number of past alliances a firm has formed.[299] In studying the impact of certain capabilities on firm performance in the pharmaceutical industry, De Carolis (2003) measured marketing capabilities through the relative advertising expenditures (total advertising expenditures divided by total sales for a given year) and technological capabilities through evaluating a ratio of patent-citations: company A issues N number of patents during a given year and within 2 years of their issue date, M patents cites these N patents; of these M citations, X patents belong to company A (self-citing) and thus the ratio of X/N is the measure used for technological competence.[300] Another possibility is introduced by Coff (2002), who assesses the industry-level variable (here, an industry's human capital intensity) and argues that this may be a reasonable proxy for a firm's human capital intensity. Since RBT has to deal with measuring unobservable constructs, Coff suggests that testing the predicted relationships through observable variables that are linked to the unobservable constructs within RBT might be helpful in this regard.[301]

Regarding the ***value*** of a resource and the use of ***constructs***, researchers developed several scales for a variety of resources.[302] For example, Carmeli and Tishler (2004a+b), assessed if certain organizational resources and capabilities accounted for variations in firm performance and developed several scales for organizational reputation, organizational culture, internal auditing routines, managerial capabilities, and human capital in general.[303] In the context of RBT and organizational economics, Combs and Ketchen (1999) evaluated the question

[297] Cf. Miller/Shamsie (1996), p. 532.
[298] Cf. Rao (1994), p. 36.
[299] Cf. Gulati (1999), p. 405.
[300] Cf. De Carolis (2003), p. 39.
[301] Cf. Coff (2002), p. 125.
[302] In chapter 3.2.1.2, within Table 12 and Table 13, reliability measures are being provided for all of the scales outlined within Tables 6-9. Furthermore, these scales will be consolidated regarding regularities while parameterizing strategic resources, i.e., I will identify items in this connection.
[303] Cf. Carmeli/Tishler (2004a), p. 306f and (2004b) 1264f.

whether new operations of restaurant chains should be managed as wholly-owned entities or through interfirm cooperation, and thereby developed a scale for brand name reputation, the latter being a decisive resource while making this decision.[304] Schilling and Steensma (2002) assessed the impact of technological capabilities on firm boundaries and on sustainable advantage, developing several sub-scales for conceptual antecedents of technological capabilities, i.e., a sub-scale for commercial uncertainty (items that assess the degree to which managers were confident that the technology would meet technical and/or commercial expectations), for dynamism (items on length of time the technology is expected to be valuable or the length of its life cycle), and the potential for sustainable advantage (items that captured the degree to which managers felt that the technology would differentiate the firm, or the degree to which managers felt that competitors would be able to reap similar strategic benefits within a short period of time).[305] As for human resources, Welbourne and Andrews (1996) evaluated the degree to which a company values its employees as a strategic resource, developing a scale with items such as 'the company's strategy and mission statements cited employees as a competitive advantage' or 'an officer with responsibility for human resource management was present'.[306]

Concerning the ***rareness*** of a resource, Maijoor and Witteloostuijn (1996), for instance, used as a proxy Herfindahl-Hirschmann indices to measure the degree of human resource concentration.[307] Similarly, Bennett et al. (1998) assessed employees as rare resources through labor market munificence, using several items which reflect the scarcity of resources, e.g., 'How would you assess the labor supply for this organization overall?'[308] Steensma and Fairbank (1999) evaluated the rarity of technology through four different items, whereas Schilling and Steensma (2002) concentrated on the uniqueness of technological capabilities, yet, basically applying the same items.[309]

As to the ***inimitability*** of a resource, Markman et al. (2004) used important patents – operationalized through citation rates as a proxy – to represent a certain monopolistic protection to demonstrate barriers for imitation.[310] As observant readers might have noticed, De Carolis (2003) used more or less the same proxy to represent the value of technological capabilities as outlined above. McEvily and Chakravarthy (2002) assessed the inimitability of

[304] Cf. Combs/Ketchen (1999), p. 877.
[305] Cf. Schilling/Steensma (2002), p. 397.
[306] Cf. Welbourne/Andrews (1996), p. 901.
[307] Cf. Maijoor/Witteloostuijn (1996), p. 555.
[308] Cf. Bennett et al. (1998), p. 9.
[309] Cf. Steensma/Fairbank (1999), p. 28; Schilling/Steensma (2002), p. 397.
[310] Cf. Markman et al. (2004), p. 535f.

technological capabilities through four different sub-scales representing the resource specificity, design specificity, tacitness and product complexity.[311] Similarly, Kogut and Zander (1993) developed three different sub-scales for the inimitability of manufacturing capabilities, concentrating on their codifiability, teachability, and complexity.[312] Interestingly, Hatch and Dyer (2004), who explore human capital as a source for performance in the semiconductor manufacturing industry, use previous experience and turnover as proxies for the inimitability of human resources – again, the same proxies used by others to represent value, e.g., Gulati (1999).[313]

Regarding the ***non-substitutability*** of a resource, Markman et al. (2004) used the number of claims listed by each patent as a proxy for the non-substitutability of the competencies held by the firm, whereas claims define the scope of an invention and distinguish its property from the surrounding technological territory.[314] Maijoor and Witteloostuijn (1996) used a dummy variable for two different time-periods to represent the non-substitutability of human resource skills, e.g., of register accountants (RA): The authors argue that the law prohibits any substitution, since only RAs were allowed to provide audit services during the first period of the study whereas in the second period there were changes in financial accounting regulation, i.e., RAs are substitutable within the second period.[315] Additionally, Deephouse (2000) argues that substitutability in this connection can be assessed indirectly through product-market positions: "…very different resources can be strategic substitutes. A study that measures many resources can test if one is a substitute for another, but the current lack of generalizable resource measures makes this difficult […] The recognition that product-market positions and resources "are two sides of the same coin" (Wernerfelt, 1984: 171) can be used to assess substitutability of these different resources indirectly. Product-market positions represent bundles of underlying resources […] The inclusion of these positions in a model partially controls for these resource bundles."[316]

Overall, there are altogether only 6% of the studies operationalizing more than one of the four conditions, i.e., concurrently measuring more than one resource condition at the same time.[317]

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[311] Cf. McEvily/Chakravarthy (2002), p. 295.
[312] Cf. Kogut/Zander (1993), p. 641.
[313] Cf. Hatch/Dyer (2004), p. 1167.
[314] Cf. Markman et al. (2004), p. 536f.
[315] Cf. Maijoor/Witteloostuijn (1996), p. 555.
[316] Deephouse (2000), p. 1099. Deephouse (2000) includes measures of product market position and tests to see if they attenuate the effect of media reputation on performance.
[317] Cf. Borch et al. (1999); Carmeli (2004); De Carolis (2003); Hatch/Dyer (2004); King/Zeithaml (2001); Knott (2003); Kogut/Zander (1993); Maijoor/Witteloostuijn (1996); Markides/Williamson (1996); Markman et al. (2004); McEvily/Chakravarthy (2002); Schilling/Steensma (2002); Deephouse (2000).

Furthermore, less than 2% tried to statistically measure the impact of all four characteristics on sustainable performance, thus, it seems that the question whether a firm can gain sustainable rents if its resources available are simultaneously high in value, rareness, inimitability, and non-substitutability, than if its resources are deficient in any of the four characteristics, still remains rather unexplored, and thus, unanswered.[318]

In summary, through looking at 192 empirical studies and their operationalization of *resources* and their *conditions* it becomes apparent that: (a) still 35% of resource-based empirical studies fall short on the operationalization of the central constructs' conditions, and rather concentrate on resources in general; (b) about 60% of the studies do not provide with an adequate resource definition and it is not distinguishable whether they refer to a unique resource or a resource-bundle; (c) the inimitability, rareness, and non-substitutability conditions are under-represented; (d) there has been little effort to systematically explore and simultaneously operationalize all four resource conditions in order to prove the impact of such resources on performance; yet, (e) multiple operationalizations of resources and their conditions *do* exist, and prove that an empirical parameterization of this construct is possible. Subsequently, these examples will be used to derive general guidelines for parameterizations.

3.2.1.2 Guidelines for Measuring Resources

In order to develop guidelines on how to parameterize the ***independent variables*** of resource-based studies, i.e., resources and their conditions, the following section starts with evaluating the items from the review used to represent the four resource conditions.

First of all, the scales from the review for the specific resources and their conditions are depicted in Table 12 (tangible resources) and Table 13 (intangible resources). Both tables provide information on the source, the number of items used, as well as their reliability values. The items themselves – whenever attainable – have already been outlined in Tables 6-9; in some cases authors only provided the number of items and gave just a few exemplary items.

[318] Cf. Carmeli (2001, 2004); Maijoor/Witteloostuijn (1996). Within their empirical RBT study, Markman et al. (2004) came to similar results: "For example, our review of top-tiered management journals could not identify an empirical study in which a single resource was operationalized, concurrently, as valuable, rare, inimitable, and non-substitutable. This was surprising because according to resource-based view (RBV) an advantage that is derived from anything less than all four attributes would quickly be neutralized. Others point out that the practical utility of valuable, rare, inimitable, and non-substitutable resources remains open to discussion until researchers and managers measure the extent to which such resources are related to superior performance." Markman et al. (2004), p. 530.

SCALES FOR TANGIBLE RESOURCES			
SCALE	**SOURCE**	**ITEMS***	**RELIABILITY**
***VALUE*:**			
technology resources	Ray, Barney & Muhanna (2004), p. 30	6 items	α = 0.65
investments	Ray, Barney & Muhanna (2004), p. 30	2 items	α = 0.78
***RARENESS*:**			
technology resources	Steensma & Fairbank (1999), p. 28	4 items	α = 0.70
***INIMITABILITY*:**			
technology resources	Borch, Huse, & Senneseth (1999), p. 56	2 items	α = 0.77
technology resources	Steensma & Fairbank (1999), p. 28	4 items	α = 0.71
* The list of items – if provided by the author – can all be found within the examples in Tables 6-9.			

Table 12: Scales for Tangible Resources from the Review

SCALES FOR INTANGIBLE RESOURCES			
SCALE	**SOURCE**	**ITEMS***	**RELIABILITY**
***Value*:**			
brand name reputation	Combs & Ketchen (1999), p. 877	4 items	α = 0.87
organizational reputation	Carmeli & Tishler (2004a), p. 306f	8 items	α = 0.76
organizational reputation	Carmeli & Tishler (2004b), p. 1264f	9 items	α = 0.82
organizational networks	Borch, Huse, & Senneseth (1999), p. 56	(no complete item-list)	α = 0.76
organizational culture	Carmeli & Tishler (2004a), p. 306f	8 items	α = 0.82
organizational culture	Carmeli & Tishler (2004b), p. 1264f	8 items	α = 0.82
organizational culture	Chan, Shaffer, & Snape (2004), p. 24f	5 sub-scales, 21 items	α = 0.84
		(no complete item-list):	α = 0.75
		involvement , *member conformity* , *policy*	α = 0.55
		consistency , *adaptability* , and *mission*	α = 0.81
			α = 0.85
organizational culture	Zahra, Hayton, & Salvato (2004), p. 370	5 sub-scales – *individual orientation* (4	α = 0.67
		items); *external orientation* (5 items);	α = 0.78
		decentralization (4 items); *financial*	α = 0.63
		controls (5 items), and *strategic controls*	α = 0.65
		(3 items);	α = 0.68
TQM routines	Powell (1995), p. 24	47 items (no complete item-list)	α = 0.78-0.90
internal auditing routines	Carmeli & Tishler (2004a), p. 306f	(no complete item-list)	α = 0.71
internal auditing routines	Carmeli & Tishler (2004b), p. 1264f	6 items	α = 0.89
customer service process	Ray, Barney, & Muhanna (2004), p. 30	4 items	α = 0.75
administrative governance systems	Borch, Huse, & Senneseth (1999), p. 56	(no complete item-list)	α = 0.75
managerial skills	Carmeli & Tishler (2004a), p. 306f	9 items (no complete item-list)	α = 0.81
managerial capabilities	Carmeli & Tishler (2004b), p. 1264f	12 items	α = 0.88
entrepreneurial competence	Chandler & Hanks (1994), p. 82	6 items	α = 0.70
CEO entrepreneurial competence	Wiklund & Shepherd (2003), p. 1311	9 items (no complete item-list)	α = 0.75
managerial competence	Chandler & Hanks (1994), p. 82	6 items	α = 0.84
managerial IT-knowledge	Ray, Barney, & Muhanna (2004), p. 30	4 items	α = 0.75

SCALES FOR INTANGIBLE RESOURCES			
SCALE	**SOURCE**	**ITEMS***	**RELIABILITY**
***Value*:**			
human capital	Carmeli & Tishler (2004a), p. 306f	12 items (no complete item-list)	α = 0.79
human capital	Carmeli & Tishler (2004b), p. 1264f	12 items	α = 0.80
human resources	Bennett, Ketchen, & Schultz (1998), p. 9	4 items (no complete item-list)	α = 0.82
human resources	McGrath, Tsai, Venkataraman, & MacMillan (1996), p. 402	2 sub-scales – *causal understanding* and *team proficiency*	α = 0.90 α = 0.88
organizational knowledge (HC)	Wiklund & Shepherd (2003), p. 1311	11 items	α = 0.84
specific knowledge (HC)	Combs & Ketchen (1999), p. 877	4 items	α = 0.86
HR competence	Wright, McMahan, McCormick, & Sherman (1998), p. 27	3 sub-scales – *skilled employees* (2 items); *efficient production* (2 items); *new business development* (3 items)	α = 0.69 α = 0.70 α = 0.57
HRM practices	Harel & Tzafrir (1999), p. 189f	5 sub-scales – *selection* (12 items); *training* (6 items); *incentive compensation* (4 items); *2 employee participation* (10 and 5 items); *internal labor market* (3 items); (no complete item-list)	α = 0.79 α = 0.76 α = 0.83 α = 0.81 α = 0.85 α = 0.74
HR practices	De Saá-Pérez & García-Falcón (2002), p. 131	(no complete item-list)	α = 0.59
HRM practices	Delaney & Huselid (1996), p. 954f	5 sub-scales – *staffing selectivity index* (3 items); *training index* (3 items); *incentive compensation*; *decentralized decision making*; *internal labor market index*;	α = 0.66 α = 0.88 α = 0.83 α = 0.91 α = 0.82
HR practices	Khatri (2000), p. 346	6 sub-scales – *recruitment/selection* (4 items); *training/development* (5 items); *performance appraisal* (2 items); *compensation/benefits* (4 items); *HR planning* (9 items); *employee participation/involvement* (3 items)	α = 0.76 α = 0.76 α = 0.88 α = 0.76 α = 0.89 α = 0.88

SCALES FOR INTANGIBLE RESOURCES			
SCALE	**SOURCE**	**ITEMS***	**RELIABILITY**
***Value*:**			
HRM effectiveness	Richard & Johnson (2001), p. 303	(no complete item-list)	α = 0.89
HRM capabilities	Huselid, Jackson, & Schuler (1997), p. 175	2 sub-scales – *professional HRM capabilities* (11 items); *business-related capabilities* (3 items)	α = 0.85 α = 0.61
HRM capabilities	Chan, Shaffer, & Snape (2004), p. 24f	2 sub-scales – *employee skills and organizational structure* and *employee motivation and communication'* (no item-list)	α = 0.68 α = 0.72
technological capabilities	Spanos & Lioukas (2001), p. 915 and 931	3 items	α = 0.80
technological capabilities	Schilling & Steensma (2002), p. 397	3 sub-scales – *commercial uncertainty* (5 items), *dynamism* (2 items), and *potential for sustainable advantage* (3 items); (no complete item-list)	α = 0.86 α = 0.65 α = 0.81
manufacturing capabilities	Christmann (2000), p. 680	5 items	α = 0.86
manufacturing capabilities	Schroeder, Bates, & Junttila (2002), p. 116	3 sub-scales – *process and equipment* (4 items), *internal learning* (4 items), and *external learning* (4 items)	α = 0.82 α = 0.74 α = 0.70
marketing capabilities	Spanos & Lioukas (2001), p. 915 and 931	(no complete item-list)	α = 0.77
organizational capabilities	De Saá-Pérez & García-Falcón (2002), p. 131f	(no complete item-list)	α = 0.75
organizational capabilities	Spanos & Lioukas (2001), p. 915 and 931	7 items	α = 0.99
environm. issues integration cap.	Judge & Douglas (1998), p. 257f	4 items	α = 0.90
competitive capabilities	McEvily & Zaheer (1999), p. 1144	3 sub-scales – *pollution prevention* (3 items), *competitive scanning* (3 items), and *quality management* (3 items)	α = 0.72 α = 0.81 α = 0.61

Table 13: Scales for Intangible Resources from the Review

SCALES FOR INTANGIBLE RESOURCES			
SCALE	**SOURCE**	**ITEMS***	**RELIABILITY**
***Value*:**			
strategy making process capability	Hart & Banbury (1994), p. 259	5 sub-scales – *command* (3 items); *symbolic* (3 items); *rational* (4 items); *transactive* (4 items); *generative* (3 items)	α = 0.67 α = 0.70 α = 0.76 α = 0.70 α = 0.61
***Rareness*:**			
human resources	Bennett, Ketchen, & Schultz (1998), p. 9	3 items (no complete item-list)	α = 0.79
technological capabilities	Schilling & Steensma (2002), p. 397	3 items (no complete item-list)	α = 0.72
***Inimitability*:**			
technological capabilities	Schilling & Steensma (2002), p. 397	3 items (no complete item-list)	α = 0.81
technological capabilities	McEvily & Chakravarthy (2002), p. 295	4 sub-scales – *resource specificity, design specificity, tacitness,* and *complexity*	α = 0.79 α = 0.75 α = 0.93 α = 0.89
manufacturing capabilities	Kogut & Zander (1993), p. 632ff and 641	3 sub-scales – *codifiability* (4 items), *techability* (5 items), and *complexity* (4 items)	α = 0.678 α = 0.785 –
manufacturing capabilities	Zander & Kogut (1995), p. 81f. and 88	6 sub-scales – *codifiability, teachability, complexity, system dependence* (4 items), *product observability* (4 items), and *parallel development*	α = 0.678 α = 0.785 – α = 0.637 α = 0.772 –
organizational capabilities	Sharma & Vredenburg (1998), p. 347		α = 0.93
*	The items – if provided by the author – can all be found within the examples in Tables 6-9. If a complete list was not attainable, exemplary items are provided for the majority of cases.		

Overall, the reliability values – Cronbach's alpha – tend to be above 0.7, following Nunnally's (1978) suggested "cutoff".[319] In about 60% of these studies, researchers relied on former work, i.e., adapted and modified scales from contributions with related research areas. If no former scale existed, researchers tried to retrieve the items through (a) extensive literature reviews; (b) interviews with academic and industry experts; and/or (c) pre-case studies, to gain an insight into the resource of interest through conducting interviews, observations, etc.

Building on these examples and items, I will now consolidate key-items on how to measure resources and their conditions. Therefore, I will first revert to the theoretical background of this construct as mentioned in chapter 2.3.3.1. In assessing strategic resource characteristics, researchers can explore different condition-dimensions:

- the ***value*** of a resource can be expressed through its *efficiency*, *effectiveness*, and *market benefit*;
- the ***rareness*** of a resource can be shown through its *restricted availability*;
- the ***inimitability*** of a resource can be revealed through its firm-specific development, social complexity, specificity, causal ambiguity, and artificial mechanisms;
- and the ***non-substitutability*** of a resource can be assessed through the possibility of using *strategic equivalents* or *substitutes*.

For identifying key-items, this theoretical framework is being used to assign the aforementioned examples and scales according to these dimensions, e.g., while operationalizing the value (rareness, inimitability, and non-substitutability) of resources, which dimension was in the author's focus, and how did he or she parameterize it? Tables 12-15 give an overview of these key-items, outlining explanations, as well as guidelines for survey questions, and examples for using proxies in this connection.

[319] Cf. Cronbach (1951); Nunnally (1978).

VALUE				
Dimension	**Key-Item**	**Explanation**	**Survey (Question Guidelines)**	**Proxy (Examples)**
Efficiency	Absolute Efficiency Value of Input Value of Output	The resource should be able to produce a satisfying (i.e. X<1) "input/output"- ratio.	Survey questions should: (1) determine inputs, resp., resources (2) determine output (3) relate value of process output to value of resource input	(1) e.g., ivestments in or costs for these resources; (2) e.g., number of products; (3) e.g., relative expenditures in sales department = total expend. div. by total sales
	Relative Efficiency Firm (V.o.I. / V.o.O.) Industry/Competitor (V.o.I. / V.o.O.)	The resource should be able to produce a satisfying 'input/output' ratio in comparison with other decisive ratios.	Survey questions should refer to the relative efficiency compared to: (1) competitors (2) industry (3) state without utilizing these resources	(1) e.g., relative R&D intensity (expenditure/sales) div. by competitor R&D intensity; (2) e.g., relative R&D intensity (expenditure/sales) div. by industry R&D intensity;
Effectiveness	Cost Reduction	The resource should be able to reduce costs for the firm (according to plan).	Survey questions should address first the cost reduction potential of a resource and, second, the degree of plan fulfilment due to the resource.	E.g., controlling data, i.e., ratio of actual cost reduction and planned costs.
	Quality Enhancement	The resource should be able to produce and enhance quality for the firm (according to plan).	Survey questions should address the resource potential to produce and enhance output quality as well as the degree of the plan fulfilment due to this resource. Indications for quality through estimating output quality-related constructs.	E.g., return rate, customer relationships, controlling data (ratios of actual vs. planned quality data).
Market Benefit	Customer Satisfaction	The resource should be able to increase customer satisfaction.	Survey questions should address the resource potential to in-crease customer satisfaction (utilize marketing constructs).	E.g., statistics from marketing reports, number of strong installed customer base, market-based rewards/contests.

Table 14: Key-Items Value Resource Condition

INIMITABILITY				
Dimension	**Key-Item**	**Explanation**	**Survey (Question Guidelines)**	**Proxy (Examples)**
Firm-specific development	Time compression	Time compression criteria impair a resource's imitability because of a firm's cost and knowledge advantages.	Survey questions should address the development time of a resource, its life cycle, and its organizational tenure as well as its hereby entailed cost and knowledge advantages.	E.g., organizational tenure re-pre-sents the knowledge of the company (production, R&D) but also its history, policies, culture, strategy, processes, systems; length of a resource's life cycle in years.
	Path dependencies	A resource's path dependencies might impede its imitability, i.e., not all options of imitating are open to every firm because of dependencies arising through time.	Survey questions should address the possibilities for competitors to go the same way, i.e., identify path dependencies for using this resource to gain competitive advantages.	E.g., lacking credibility due to critical events in the past, large investments in totally different production plants, etc.
Social complexity	Linkages	An increasing number of re-source linkages impede its imitability.	Survey questions should address the multitude of linkages of resources, resource components, and the competitive advantage.	E.g., number of different patents for a special technology field, number of distinctive skills or competencies embraced by an activity.
	System dependence	An increasing system dependence of a resource impedes its imitability.	Survey questions should address the impediment of imitating a re-source due to de-pen-dence on many different experi-enced (groups of) people for its production.	E.g., number of different R&D groups within a firm for together developing a product.
Specificity	Resource specificity	If a resource is most productive when used in conjunction with complementary resources that are idiosyncratic to the focal firm, its inimitability increases.	Survey questions should address the extent to which what a firm knows about product components is specific to a customer, application, or component varieties.	E.g., number of product; components number of specific varieties
	Design specificity	If a resource is applied to serve a set of end user that is unique to the focal firm, its inimitability increases.	Survey questions should capture the degree of specialized architectural knowledge by tailoring its adhesive formulas for individual customers and applications.	E.g., single customer relationships; single application purposes

INIMITABILITY				
Dimension	**Key-Item**	**Explanation**	**Survey (Question Guidelines)**	**Proxy (Examples)**
Causal ambiguity (Tacitness)	Codifiability	A resource's decreasing codifiability enhances its inimitability.	Survey questions should capture the extent to which knowledge or resource mechanisms could be articulated and coded.	E.g., information coded in documents, software, skill data bases, etc (firm-intern).
	Teachability	A resource's decreasing teachability enhances its inimitability.	Survey questions should capture the ease at the individual level by which knowledge, even if it's not formally articulated, can be taught.	E.g., employee trainings (training hours) vs. training on the job (no training hours).
	Observability	A resource's decreasing observa-bi-li-ty impairs its imitability.	Survey questions should check whether the resource can be acquired by reversed en-gineering or from published reports.	E.g., published reports, production plans, etc (firm-extern).
	Linkage ambiguity	A resource's increasing linkage ambiguity (lack of under-stan-ding the chain of cause and effect) impairs its imitability.	Survey questions should address the degree of a firm's under-stan-ding of the chain of cause and effect and their options of identifying the factors respon-sible for competitive advantage.	E.g., interpretation of press statements.
Artificial mechanisms	Legal protection	Possible legal protection mechanisms can prevent a resource imitation.	Survey questions should capture the possibilities for a resource's legal protection.	E.g., patents, licenses, etc.

Table 15: Key-Items Inimitability Resource Condition

RARENESS				
Dimension	**Key-Item**	**Explanation**	**Survey (Question Guidelines)**	**Proxy (Examples)**
Restricted availability	Juristic liability	The resource should be subjected to juristic liabilities.	Survey questions should address juristic liabilities of a resource by looking, e.g., at its possible legal conditions in contracts.	E.g., long-term contracts, agreements, etc.
	Uniqueness	The resource should be unique.	Survey questions should address the resource's uniqueness due to its novelty.	E.g., year of invention.
	Munificence	The resource market should not be munificent.	Survey questions should address the munificence of a market and/or industry on the particular resource by looking at its concentration.	E.g., degrees of concentration (Herfindahl-Hirschman indices), for example for different education levels for HR.

NON-SUBSTITUTABILITY				
Dimension	**Key-Item**	**Explanation**	**Survey (Question Guidelines)**	**Proxy (Examples)**
Strategic equivalents	Output congruity	The lack of totally different resources which could achieve the same output (same competitive advantage) confirm a resource's non-substitutability.	Survey questions should capture the competitors' options to achieve the same competitive advantage with totally different resources. The output congruity can be used as an indicator as well as product-market positions.	E.g., number of alternative production processes.
Substitutes	Restricted substitution due to causal ambiguity	The arguments used for a resource's inimitability become effective in this connection. When a resource is difficult to imitate, the options for substitution are limited.	Survey questions should capture the limited options for substitution due to the inimitability of a resource.	E.g., count of competitors perceived as engaged in parallel efforts aimed at developing a similar product at the time of the innovations' release.
	Legal regulation	Possible legal regulation conditions can prevent a resource substitution.	Survey questions should capture possible legal regulations in con-nection with production/service conditions and whether these impair/prevent a substitution.	E.g., number of imposed conditions for production (e.g., certain political, social, or juristic restrictions as to what resources have to be used).

Table 16: Key-Items Rareness and Non-Substitutability Resource Conditions

(1) Key-Items for Operationalizing Value

The *first* possibility in expressing the value of a resource is to demonstrate that it enhances efficiency.[320] Efficiency is a productivity metric and is usually described as "doing things right". In other words: "Efficiency is a measure that relates the value of the output of the process to the value of the input."[321] Thus, the resource enhances efficiency if the input/output-ratio is less than one. To really conclude on the question of efficiency enhancement, one needs to compare this ratio with either (a) the state without this resource, (b) a competitor's ratio, or (c) the industry ratio on this subject.[322]

The *second* possibility in expressing the value of a resource is to demonstrate that it enhances effectiveness. Effectiveness is a quality metric and is usually described as "doing the right things". In other words: "Effectiveness is as measure of actual output against planned output."[323] Thus, in determining effectiveness some plan or standard has to be established so that the actual output can be measured and compared with the plan. According to Marshall et al. (1975), the measurement of effectiveness goes along many dimensions, but the two most important ones are 'cost' as in cost reduction potential, and 'quality' as in quality enhancement potential.[324] Table 14 depicts these two as key-items for measuring effectiveness, which for both of them involves first checking the resource potential to fulfill these requirements, and second, determining the setting of goals in this connection and the measurement of performance relative to these goals. As for the quality effectiveness, indications for producing and enhancing quality can be seen within the output quality, which can be assessed by determining quality-related constructs, such as return rates or the number and the length of customer relationships.[325]

The *third* possibility in expressing the value of a resource is to show that it increases market benefit, which is defined in chapter 2.3.3.1 as the generation of significant benefits for the customer. In trying to manifest these benefits, the simplest way would be to look at the market success of a firm, as in the acceptance (usage) of its output. Following Levitas and Chi

[320] "Superior resources are more 'efficient' in the sense that they enable a firm to produce more economically and/or better satisfy customer wants. In other words, firms with superior resources can deliver greater benefits to their customers for a given cost (or can deliver the same benefit levels for a lower cost). Note that this is a broad view of 'efficiency' in that it is concerned not just with lowering costs, but also with creating greater value or *net* benefits (Peteraf, 2001)." Peteraf/Barney (2003), p. 311.
[321] Marshall et al. (1975), p. 10.
[322] Cf. Ray et al. (2004); Pisano (1994); Knott et al. (2003); Miller/Shamsie (1996); De Carolis (2003); Combs/Ketchen (1999); Christmann (2000); Sakakibara (2002).
[323] Marshall et al. (1975), p. 11.
[324] Cf. Marshall et al. (1975), p. 11.
[325] Cf. McEvily/Zaheer (1999); Tripsas (1997); Kraatz/Zajac (2001); Morris (1997); De Carolis (2003); Carmeli/Tishler (2004a+b); Powell (1995); Ray et al. (2004); Richard/Johnson (2001); McGrath et al. (1996).

(2002), "…often one must validate a theory empirically through verification of its predictions without having to operationalize all of its key constructs […] In other words, researchers can test for the existence of such "unobservables" by examining their observable outcomes."[326] Due to endogenous problems, these measures are to be treated with utmost caution because these variables are usually used to represent the dependent variable, i.e., the performance measure. Thus, another more indirect way would be to look at measures that represent a customer's satisfaction and appreciation of the firm and its output, assuming that high satisfaction correlates with customer benefits.[327]

(2) Key-Items for Operationalizing Rareness

To express the rareness of a resource, researchers can explore the resource's restricted availability. *First*, one can test for juristic liabilities to which a resource could be subjected, which would limit its access. *Second*, scholars can check for the uniqueness of a resource due to its novelty, which would limit its dissemination. *Third*, the possibility most often used to represent the rareness of a resource, in the sense of its restricted availability, is the market munificence for this resource, expressed by using concentration degrees.[328]

(3) Key-Items for Operationalizing Inimitability

The *first* possibility in expressing the inimitability of a resource is to show that its firm-specific development impairs its imitability over time. For instance, the firm-specific development can result in time compression criteria which operate in favor of the firm, due to the firm's cost and knowledge advantages. In other words, while developing the resource, knowledge and cost advantages arise through time, therefore, researchers should analyze the development time of a resource, its organizational tenure, and its life cycle. Additionally, the firm-specific development can lead to path dependencies which themselves can result in limited imitation options for competitors, who chose different paths in their past. Thus, empirically, scholars should discover possible path dependencies.[329]

The *second* possibility in expressing the inimitability of a resource is to prove its social complexity. Here, researchers can check for the multitude of linkages between resources, resource components, as well as explore the system dependence of a resource which would also impair its imitability. The *third* possibility in expressing the inimitability of a resource is

[326] Levitas/Chi (2002), p. 960.
[327] Cf. Schilling/Steensma (2002); Rao (1994); Miller/Shamsie (1996).
[328] Cf. Maijoor/Witteloostuijn (1996); Steensma/Fairbank (1999); Schilling/Steensma (2002); Bennett et al. (1998).
[329] Cf. Combs/Ketchen (1999); Sharma/Vredenburg (1998).

to analyze its specificity, by either looking at the resource specificity (i.e., similar to system dependence, yet, the focus here lies in the conjunction with other idiosyncratic, and hence very specific firm resources) or design specificity (i.e., if a resource is applied to serve a set of end users, unique to the focal firm). The *fourth* possibility would be to assess its causal ambiguity. Therefore, researchers can rely on four key-items to attest inimitability in this connection: a decreasing codifiability, teachability, and observability of a resource as well as an increasing linkage ambiguity (i.e., lack of understanding the chain of cause and effect) impede a resource's imitability. *Finally*, researchers can capture the degree of artificial imitation protection mechanisms referring to the prevention of resource imitation through legal protection mechanisms (e.g., patents).[330]

(4) Key-Items for Operationalizing Non-Substitutability

As to the last resource condition, the *first* possibility for empirical researchers to confirm the non-substitutability of a resource would be to capture the competitors' options to achieve the same competitive advantage with strategic equivalents, i.e., totally different resources.[331]

The *second* possibility would be to look for possible substitutes (similar resources). Here, a restricted substitutability can result from two reasons: On the one hand, limited options for substitution arise due to the inimitability of a resource, whereas on the other hand, legal regulation mechanisms may prevent the substitution of a resource if, for example, the government itself imposes legal regulations on this resource (e.g., production conditions) which, in conclusion, can impede its substitutability.[332]

(5) Brief Summary

The aforementioned key-items were derived from empirical examples and tuned to the theoretical bases of the constructs. In doing so, they offer a good starting point for resource-based empirical research to operationalize strategic resources through either relying on survey guidelines or using proxies in this connection. Yet, this list of key-items does not claim to be complete and might be extended for other items representing dimensions of the four resource conditions. Moreover, this list might not be universally applicable for every resource and should be adjusted according to the respective research project. In order to prove one or more of the four resource conditions, researchers can use these key-items, independently or in combination, whereas the reliability will increase when relying on more than one key-item. In

[330] Cf. King/Zeithaml (2001); McEvily/Chakravarthy (2002); Markman et al. (2004); Schilling/Steensma (2002); Zander/Kogut (1995); Kogut/Zander (1993).
[331] Cf. Deephouse (2000).
[332] Cf. Markman et al. (2004); Maijoor/Witteloostuijn (1996).

other words, scholars should see this list as a guideline to conduct their research and rely on this basis for developing their individual scales.

3.2.2 Dependent Variable: Performance

Regarding the central construct ***performance***, this section will give an overview on the operationalization of performance within the 192 studies, while also outlining a variety of examples in this connection. The focus lies on different levels of performance, its different conditions (temporary vs. persistent), and if these measures are suitable to represent rents. Moreover, guidelines for further empirical research will be outlined.

3.2.2.1 Operationalizing Performance

As most studies of organizational performance, RBT research usually defines performance as the dependent variable and seeks to identify variables – here, generally resources and capabilities – that produce variations in performance.[333] In concentrating on the operationalizations of ***performance***, Table 17 consolidates some interesting facts and findings:

Dependent Variable-Definitions*	# of Tests	% of Tests
Performance	**147**	**77%**
Rents	63	-
Competitive Advantage	59	-
Both	25	-
Performance-Conditions*	**# of Tests**	**% of Tests**
Temporary	**68**	**47%**
Persistent	**79**	**53%**
Performance-Level*	**# of Tests**	**% of Tests**
Firm-Level Performance	**125**	**78%**
Objective Data	77	-
Subjective Data	35	-
Both	13	-
Lower-Level Performance	**35**	**22%**
Objective Data	10	-
Subjective Data	18	-
Both	7	-
Multiple Levels	**11**	**7%**
Performance-Complications*	**# of Tests**	**% of Tests**
Performance Control Variables	**30**	**20%**
Feedback Loops	15	-
Retrospective Bias	4	-
Others	11	-
* Note that one study can be allotted to more than one category.		

Table 17: Operationalizing Performance within Empirical Tests of RBT

[333] For a comprehensive discussion on the determinants of organizational performance from a multidisciplinary perspective, see Lenz (1981).

Overall, about 77% of the studies operationalized ***performance*** as the dependent variable, whereas the remaining 23% concentrated on specific conducts as dependent variable, e.g., governance modes, diversification choices, strategic choices etc.[334] In reference to the argumentation in chapter 2.3.3.2 on the dependent variable of empirical RBT tests, it seems though that researchers equally argue ***rents*** and ***competitive advantages*** within their definitions (see Table 17). However, looking closely at the operationalizations of the dependent variable, those represent measures to capture performance differences in terms of rents (80%) rather than being suitable measures for competitive advantages (20%); hence, appropriate measures for competitive advantage are relatively rare.

A good example for distinguishing and measuring both *rents* and *competitive advantage* can be found within the contribution of King and Zeithaml (2001), who examine the relationship between firm performance and causal ambiguity regarding the link between competencies and competitive advantage. The authors assess both, the impact of competencies on performance and competitive advantage, whereas competitive advantage acts as a moderator. King and Zeithaml define rents as firm performance (ROA) and assess competitive advantage through a measure that captures the average managerial responses for several competencies regarding their ability to provide their firm superior competitive advantage.[335] Also, another good example for operationalizing *competitive advantage* can be found within Makhija's (2003) contribution. She tests and compares the predictive ability of the RBT against the MBV under conditions of great change and expects a firm's resources to be the primary determinants of firm value. The empirical findings show that RBT-driven variables are better at explaining share values of Czech firms in the period of privatization than MBV-driven variables, i.e., the results underscore the role of firm resources as a primary determinant of firm value in rapidly changing environments. Thereby, Makhija concentrates on generating value instead of performance through measuring share value based on total share demand, as well as share demand by investment privatization funds, by individuals and based on stock market prices.[336] Wiggins and Ruefli's (2002) contribution is another example for arguing both *competitive advantage* and *rents*, though, measuring only the latter. The authors focus on the question whether superior economic performance persists over time, in a manner consistent with sustained competitive advantage; they define rents as statistically significantly above-average performance relative to a reference set of comparable firms and sustained competitive

[334] Cf. Borch et al. (1999); Chatterjee/Singh (1999); Dussauge et al. (2000); Steensma/Corley (2001).
[335] Cf. King/Zeithaml (2001), p. 79.
[336] Cf. Makhija (2003), p. 444.

advantage as the capabilities and resources that give a firm an advantage over its competetors.[337] Other examples for operationalizing *rents* are for instance Anand and Singh (1997) and Huselid (1995) who used Tobin's *q* as well as Farjoun (1998), Combs and Ketchen (1999), and Daily et al. (2000) who used market-to-book ratios which are a good proxy for Tobin's *q*.[338] Generally, Tobin's *q* is the more appropriate empirical measure for rents compared to accounting measures. Those have been recently getting a lot of criticism when used as proxies for rents, because accounting returns are distorted by a failure to consider differences in systematic risk, temporary disequilibrium effects, tax laws, and arbitrary accounting conventions. Accordingly, it is recommended that researchers rely on the hypothesis of an efficient capital market to get unbiased measures of capitalized rents.[339]

Additionally, reinforcing the discussion about the dependent variable in chapter 2.3.3.2, Dutta et al. (2003) argue, within their case study on pricing as a capability, that it is important not to explain competitive advantage, but *rents*. The authors assert that even if firms create value, they might not generate economic rents, emphasizing that in order to capture potential rents firms must be able to set the right prices. They claim that pricing as a capability is an important means by which a firm appropriates value through market-based exchange and so an important determinant of the ability of a firm to generate rents.[340]

Concerning the ***performance conditions***, 47% of the studies focused on ***temporary performance***, whereas 53% looked at ***persistent performance***, i.e., the sustainability of performance. Since the latter is at the core of RBT and its operationalization faces greater challenges, Table 18 outlines some inspiring examples in this connection.

SOURCE	METHOD	OPERATIONALIZATION
Barnett, Greve, & Park (1994) – firm performance	partial adjustment model; regression analysis; (*longitudinal*)	This study tests the role of managers concerning performance achievement decisions regarding the trade-off between strategic positioning and competitive capabilities: competitive forces spawn distinctive competencies (i.e., competitive capabilities, which are dynamic capabilities due to competitive forces), but managers attempt to restrict these forces when they seek positional advantage. Evaluation whether capabilities – changed through learning processes by being exposed to competition – or market positioning make for better sustainable performers. ***sustainable firm performance*** = year-to-year changes in return on average assets; ROAA: net income divided by average assets over the year; due to partial adjustment model possibility of evolutionary adjustment of capabilities (evolutionary model to analyze the dynamics of organizational performance)

[337] Cf. Wiggins/Ruefli (2002), p. 84.
[338] Cf. Wiggins/Ruefli (2002), p. 86; Anand/Singh (1997), p. 110; Farjoun (1998), p. 619; Combs/Ketchen (1999), p. 878; Daily et al. (2000), p. 519; Huselid (1995), p. 652.
[339] Cf. Montgomery/Wernerfelt (1988), p. 626. For more details see chapter 3.2.2.2.
[340] Cf. Dutta et al. (2003), p. 615f.

SOURCE	METHOD	OPERATIONALIZATION
Bates & Flynn (1995) – production performance	regression analysis (*longitudinal*)	This paper focuses on histories of firm innovations in manufacturing technology, assuming that these histories represent attempts to create unique resource configurations which will lead to competitive advantage. ***sustainable production performance*** = cost improvement (two year improvement in manufacturing cost as a percentage of sales); quality (percent of product passing final inspection without rework); volume flexibility (percentage change in production between the months with the highest and lowest production rates); delivery speed (time between the beginning of production until the date the product was delivered)
Capron (1999) – project performance (post-acquisition performance)	structural equation model (PLS); (*cross-sectional*)	This study tests the impact of post-acquisition asset divestiture and resource redeployment on the long-term performance of horizontal acquisitions. ***sustainable acquisition performance*** = self-reported measures of changes in market shares, sales, intrinsic profitability, and relative profitability compared to industry average since the acquisition
De Carolis (2003) – firm performance	time-series cross sectional regression analysis; (*longitudinal*)	This study explores the questions whether technological competence does enhance firm performance and whether competitor imitation of firm knowledge does hurt performance. ***sustainable firm performance*** = ROA and market to book value for several years
Gimeno (1999) – firm performance	partial adjustment model; (*longitudinal*)	This study investigates the outcomes of multi-market competition among US scheduled airlines when the interests and positions of the airlines differ in the mutually contested markets. The author suggest that airlines utilize their location in rivals' hub markets as a resource to reduce the competitive pressure from those rivals in their own hubs and thus to be able to sustain their dominant position in those markets. ***sustainable firm performance*** = market share of an airline-route, measured as passengers transported by the airline-route divided by all passengers transported in the market over a period of 5 years; analysis of sustainability is couched in terms of equilibrium market shares
Harrison, Hitt, Hoskisson, & Ireland (1991) – firm performance	multiple regression analysis; (*longitudinal*)	This study tests whether uniquely valuable synergy might be created where differences (versus similarities) exist between resources in the acquiring and target firms. ***sustainable firm performance*** = pre- and post-acquisition performance (ROA; 3 and 5 years of data, for the years 1970-1989)
Henderson & Cockburn (1994) – BU performance (R&D performance)	poison regression analysis; (*longitudinal*)	This study attempts to measure the importance of heterogeneous organizational competence (component and architectural competence) in competition in the context of pharmaceutical research. ***sustainable R&D performance*** = drug discovery, measured through counts of important patents over the period from 1975 to 1988.
Lorenzoni & Lipparini (1999) – firm performance	case study; (*longitudinal*)	This study explores the process of vertical disintegration and focuses on the ability to coordinate competencies and combine knowledge across corporate boundaries. The authors argue that the capability to interact with other companies (which they call relational capability) accelerates the lead firm's knowledge access and transfer with relevant effects on company growth and innovativeness. ***sustainable firm performance*** = due to longitudinal case study (interviews and secondary data bases), the authors acknowledge for development of competencies over time which affect the firm's growth and innovativeness

SOURCE	METHOD	OPERATIONALIZATION
Maijoor & Witteloostuijn (1996) – resource performance	pooled times series analysis (*longitudinal*)	This study states strategic regulation (law regulation in the audit industry) as a major source of sustainable competitive advantage. The authors predict that both the 1970 and 1983 financial accounting regulations have increased the forced demand for audit services, which would ceteris paribus increase the value and scarcity of the human capital resource of RAs. ***sustainable firm performance*** = income of RA partners, the top ranking of audit firms over the period from 1964 to 1990.
Markman, Espina, & Phan (2004) – firm performance	hierarchical regression analysis (*longitudinal*)	This study's focus lies on the question whether patents in the pharmaceutical industry can reflect a single resource that is – simultaneously – valuable, rare, inimitable, and non-substitutable and to what extent patents' inimitability and non-substitutability are associated with superior performance in the pharmaceutical industry. ***sustainable superior performance*** = non-financial and financial performance measures; superior performance operationalized as firms' new products and net income (profitability) for the period from 1995-1999
McEvily & Chakravarthy (2002) – product performance	regression analysis (*cross-sectional*)	This study examines whether and if so, how complexity, tacitness, and specificity of a firm's knowledge affect the persistence of its performance advantage. ***sustainable product performance*** = net month to imitate (minus the focal firm's own development time)
Robins & Wiersema (1995) – firm performance	regression analysis (*longitudinal*)	This paper explores the gap between the theory of the multibusiness firm and empirical study of the link between relatedness in corporate portfolios and performance from a resource-based perspective. ***sustainable firm performance*** = current firm performance (3-year average ROA) vs. continuing firm performance (6-year average ROA)
Shamsie (2003) – firm performance	multiple regression analysis (*longitudinal*)	This study links the extent of sustainable market dominance by leading firms to the ability to develop and exploit reputation as a key resource. ***sustainable firm performance*** = market dominance, i.e., market share (average market share of the dominant firm in each industry during an 8-year period from 1987 to 1994; relative market share of the leading firm during the same period; persistence of the market share of the dominant firm over the same period)
Wiggins & Ruefli (2002) – firm performance	event history analysis (*longitudinal*)	This study examines whether superior economic performance persists over time in a manner consistent with sustained competitive advantage. ***sustainable superior firm performance*** = economic performance (ROA, Tobin's *q*); superior performance operationalized as statistically significant above-average economic performance over a five-year period; measured for a period of 25 years

Table 18: Operationalization Examples DV – Sustainable Performance

For instance, Capron (1999) explores the impact of post-acquisition asset divestiture and resource redeployment on the long-term performance of horizontal acquisitions through several items used in the questionnaire. Due to the long-term post-acquisition performance check, Capron acknowledged that redeployed capabilities need time to become effective.[341] McEvily and Chakravarthy (2002) measured the persistence of product performance advantages through the number of months (net months, i.e., minus the firm's own development time)

[341] Cf. Capron (1999), p. 996f.

needed for a competitor to imitate a product improvement.[342] In particular, Gimeno (1999) explicitly addressed the challenges in capturing persistent performance, focusing on the problems concerning method choice. He defined sustainability in terms of equilibrium market shares, which are not directly observable. Since observable changes in market share may not immediately reflect shifts in equilibrium market share, market share changes may not immediately reflect the full impact of changes in the independent variables on equilibrium market share. Therefore, the author used a dynamic model, i.e., a partial adjustment model, to account for the adjustment process of change in this regard.[343]

On the subject of ***performance-levels***, Table 17 outlines that 78% of the researchers concentrated on ***firm-level performance***, whereas 22% also assessed for ***lower-level performance***, e.g., disaggregated levels, such as the efficiency in performing a particular task, as well as rather aggregated levels such as performance in accounting, sales, or production.[344] In measuring firm performance, the majority use objective data (67%) as opposed to subjective data (33%); where a lower-performance level is surveyed, researchers tend to rely considerably more on subjective data (62%) to measure their dependent variable. Presumably, objective data such as quantitative output measures are comparably more difficult to attain for lower-level performance. Moreover, Table 17 also shows that some studies use several variables (both objective and subjective data) while analyzing performance to assure their overall dependent variable, i.e., 11% using firm-performance and 20% using a lower-level performance. The following Table 19 and Table 20 present a variety of examples regarding firm- and lower-level performance to provide more details on the operationalizations.

FIRM-LEVEL PERFORMANCE (ORGANIZATIONAL PERFORMANCE)	
GROUP	**OPERATIONALIZATION**
Accounting Returns	▪ ROAA = net income / average assets over the year *(Barnett et al., 1994)*; ▪ ROA = return on assets *(Bharadwaj, 2000; Combs & Ketchen, 1999; Daily, Certo, & Dalton, 2000; De Caroli, 2003; Deephouse, 2000; Harrison et al., 1993)*; current firm performance = 3-year average ROA; continuing firm performance = 6-year average ROA *(Robins & Wiersema, 1995)*; ▪ ROS = return on sales *(Bharadwaj, 2000; Delios & Beamish, 1999; Farjoun,1998)*; ▪ OI/A = operating income to assets ratio; OI/S = operating income to sales ratio focus on operating returns only (*Bharadwaj, 2000*)

[342] Cf. McEvily/Chakravarthy (2002), p. 294f.
[343] Cf. Gimeno (1999), p. 114.
[344] Cf. March/Sutton (1997), p. 698.

FIRM-LEVEL PERFORMANCE (ORGANIZATIONAL PERFORMANCE)	
GROUP	**OPERATIONALIZATION**
Stock Markets	▪ abnormal stock market returns associated with the announcement of acquisitions (ex ante measure); pretax operating cash flows normalized by the market value of assets before and after the acquisition is implemented (ex post measure) *(Anand & Singh, 1997)*; ▪ market-to-book value = approximates the stock market's perception of the value of the firm's present and future income and growth potential (stock market perspective); *(Combs & Ketchen, 1999; Daily, Certo, & Dalton, 2000; De Carolis, 2003; Farjoun, 1998)*; ▪ long-term anticipated performance = change in a firm's value, operationalized by the cumulative abnormal return over an event window, expressed as a percentage of the firm's stock price (abnormal returns capture changes in market valuation, based on the expected future cash flow from business operations for the foreseeable future) *(Park et al., 2004)*; ▪ Tobin's *q* = sum of market value of equity, book value of debt, and deferred taxes divided by the book value of total assets minus intangible assets *(Huselid, 1995; Wiggins & Ruefli, 2002)*
Growth Measures	▪ sales growth *(McGee et al., 1995);* ▪ market share = annual percentage increase in market share *(Miller & Shamsie, 1996; Tallman, 1991, Makadok, 1999)*; ▪ firm growth = exponential growth function; natural logarithm of deflated fund assets *(Roth, 1995)*
Hybrids	▪ a subjective measure of financial performance itself, consisting of questions about the firms' overall profitability and sales growth over the previous 3-year period *(Brews & Hunt, 1999; Hart & Banbury, 1994; Ray et al., 2004)* ▪ organizational performance = perceived performance compared to competing organizations (items: quality of product/service; new product development; ability to attract and retain essential employees; customer satisfaction; etc.) *(Harel & Tzafrif, 1999);* ▪ exit rate = exit defined as bankruptcy, cessation of operations, or withdrawal by an organization (performance as survival) *(Rao, 1994; Henderson, 1999; Welbourne & Andrews, 1996)*;

Table 19: Operationalization of the Dependent Variable "Firm-Level Performance"

As to ***firm-level performance*** (see Table 19), the measures were grouped following a recent study on the dimensionality of organizational performance by Combs et al. (2005). The authors conducted a meta-analysis on 238 studies measuring performance. In contrast to the previous study by Venkatraman and Ramanujam (1986) who proposed three general levels, i.e., financial performance (accounting-based measures), business performance (market-based measures), and organizational effectiveness (stakeholder-based measures),[345] Combs et al. discovered *four general levels*. First, the authors distinguish between operational and organizational performance, whereas the latter can be furthermore categorized into accounting returns, stock market, and growth measures.[346] Table 19 outlines examples for the *three organizational performance measures* applied within the studies, whereas the additional category (hybrids) accounts mostly for survey measures and for measures focusing on firm survival.

[345] Cf. Venkatraman/Ramanujam (1986), p. 803f.
[346] Cf. Combs et al. (2005), p. 269.

As for ***lower-level performance*** (see Table 20), the measures were grouped according to Combs et al.'s (2005) *operational performance* category. The latter encompasses measures that reflect an outcome that could be tied to a specific individual value chain activity, i.e., a lower, rather disaggregated performance level.[347] Combs et al. identified the following different *operational levels*: service outcomes, human resource outcomes, operations outcomes, technological development outcomes, infrastructure outcomes, logistic outcomes, procurement outcomes, and marketing and sales outcomes. Except for the last three operational levels, researchers chose a variety of measures to explore operational performance; those are depicted in Table 20.

LOWER-LEVEL PERFORMANCE (OPERATIONAL PERFORMANCE)	
LEVEL	**OPERATIONALIZATION**
Service Outcomes	***Kraatz & Zajac (2001):*** *quality* = changes in a college's full-time-equivalent undergraduate enrollment; ***Ray, Barney, & Muhanna (2004):*** *customer service process performance* = multiple measures: customer service quality, self-assessment of service quality, weighted retention ratio, complaints ratios;
Human Resource Outcomes	***Bennett, Ketchen, & Schultz (1998):*** *HRM performance* = several items (e.g., to what extent do you feel your human resource department is performing its job the way you would like it to be performed?) ***Fey, Bjorkman, & Pavlovskaya (2000):*** *HR performance* = employee motivation, skills/knowledge development, and retention (respondents were asked to evaluate their firm's performance in: 'developing managers' skills/knowledge; developing non-managerial employees' skills/knowledge; motivating managers; motivating non-managerial employees; retaining managers; retaining non-managerial employees'); ***Galunic & Anderson (2000):*** *HR performance* (insurance agents within insurance firms) = insurer's level of satisfaction with the agent (insurer-reported); insurer's expected future benefits from maintaining this agent (insurer-reported); ***De Saá-Pérez &García-Falcón (2004):*** *HR performance* = turnover; ***Wright, McMahan, McCormick, & Sherman, (1998):*** *HRM performance* = the extent to which the operations manager felt that the department performed well, met his or her expectations, and was a value added/bottom line contributor to the business.
Technology Development Outcomes	***McEvily & Chakrravarthy (2002):*** *product performance persistence* = net month to imitate (minus the focal firm's own development time); ***Powell & Dent-Micallef (1997):*** *IT performance* = five survey items designed to measure executives' perceptions about the impacts of IT on financial performance;
Infrastructure Outcomes	***Bergh (2001):*** *acquisition outcome success* = retention (successful) vs. divestiture (unsuccessful) of acquired company (dummy variable 1/0); ***Brews & Hunt (1999):*** *strategic planning performance* = internally anchored performance measure evaluating planning capabilities and effectiveness; ***Capron (1999):*** *acquisition performance* = measured by self-reported measures of changes in market shares, sales, intrinsic profitability, and relative profitability compared to industry average since the acquisition; ***Lane & Lubatkin (1998):*** *alliance performance* = focusing on learning performance; inter-organizational learning as a capability; index = success of inter-organizational learning with the alliance; items on performance are evaluated by experts;

[347] Cf. Combs et al. (2005), p. 267. Interactive outcomes of all value chain activities were, however, coded as organizational performance. For more details on Porter's value chain concept, see chapter 2.2.2.

LOWER-LEVEL PERFORMANCE (OPERATIONAL PERFORMANCE)	
LEVEL	**OPERATIONALIZATION**
Operations Outcomes	***Bates & Flynn (1995):*** *production performance* = cost improvement (two year improvement in manufacturing cost as a percentage of sales); quality (percent of product passing final inspection without rework); volume flexibility (percentage change in production between the months with the highest and lowest production rates); delivery speed (time between beginning of production until the date the product was delivered); ***Henderson & Cockburn (1994):*** *R&D performance* = drug discovery measured through counts of important patents; ***Hoopes & Postrel (1999):*** *project performance* = 217 projects, measured in product development time; ***Klassen & Whybark (1999):*** *manufacturing performance* = managers had to assess how well their plants were performing relative to their competitors (in terms of cost, quality, speed, flexibility) and objectives measures (first-pass quality, i.e., percentage of products that meet quality standards after all operations are initially completed; measures of speed, i.e., delivery speed (days), on-time delivery, throughput time (days)); ***McGrath, MacMillan, &Venkataraman (1995):*** *project performance* = competence development, measured by the ability to achieve or exceed objectives (corporate initiative projects); items reflect how well the project is performing with respect to achieving basic objectives (such as staffing, budget, revenue, quality, reliability, cost, efficiency, user/client satisfaction, service objectives, major deadlines); ***Pisano (1994):*** *process development performance* = lead time (number of months between the start of the process development project and its successful completion); ***Poppo & Zenger (1995):*** *outsourcing performance* = level of satisfaction for both in-house and outsourced information service functions along three dimensions: 1) satisfaction with overall cost; 2) satisfaction with the quality of the output or service; and, 3) satisfaction with responsiveness to problems or inquiries; ***Powell (1995):*** *TQM performance* = 8 items related to TQM programs, e.g., 'our quality program has dramatically increased productivity', 'our quality program has improved our competitive position'; ***Schroeder, Bates, & Junttila (2002):*** *manufacturing performance* = cost as % of sales; conformance quality; % of on-time deliveries; days from receipt of raw materials to customer receipt (cycle time); length of the fixed production schedule (flexibility);

Table 20: Operationalization of the Dependent Variable "Lower-Level Performance"

For instance, regarding *human resource outcomes*, De Saá-Pérez and García-Falcón (2004) measure HR performance through employee turnover.[348] As for *technology development outcomes*, McEvily and Chakravarthy (2002) investigate the importance of technological knowledge on the persistence of product performance, measuring the latter as 'months to imitate', i.e., the number of months needed for a competitor to imitate a performance improvement.[349] In measuring *operations outcomes*, McGrath et al. (1995) measured the ability to achieve or exceed objectives of corporate initiative projects to test the impact and development of competencies. The items reflect how well the project is performing with respect to achieving basic objectives, such as staffing, budget, revenue, quality, reliability, cost, efficiency, and major deadlines.[350] Regarding *service outcomes*, Ray et al. (2004)

[348] Cf. De Saá-Pérez/Gárcia-Falcón (2004), p. 58.
[349] Cf. McEvily/Chakravarthy (2002), p. 294ff.
[350] Cf. McGrath et al. (1995), p. 258.

assessed the customer service process performance through multiple measures on customer service quality and self-assessment of service quality, as well as the weighted retention ratio and complaints ratios.[351]

These examples are still relatively rare and yet very important to acknowledge. Following Ray et al. (2004), "…a firm may excel in some of its business processes, be only average in others, and be below average in still others. A firm's overall performance depends on, among other things, the net effect of these business processes on a firm's position in the market place."[352] Thus, the best way to measure performance effects would be to simultaneously account for firm performance and a matching lower-level performance in adjustment with the phenomenon of interest. Altogether, only eleven studies could be accounted for using several performance levels at once.[353] Of those, seven studies acknowledged the net effect as outlined above: (1) the preceding example of Ray et al. (2004) using customer service process performance and firm performance;[354] (2) Bennett et al. (1998) using both organizational and BU performance, i.e., performance of the HR department, to examine the impact of HR as strategic resources, regarding the relationship between human resource management integration with strategic decision making and performance-related indicators;[355] (3) Brews and Hunt (1999) assessing two subjective perceptual measures of performance, i.e., the overall firm performance and the planning performance to address the questions of which types of planning firms should utilize in their strategy formation behaviors, and how these impact on the planning/performance relationship;[356] (4) Fey et al. (2000) testing the effect of HR outcomes (motivation, retention, and development) as a mediating variable between HRM practices and firm performance; (5) Powell (1995) using TQM performance, as well as firm performance, to explore the question whether TQM can be seen as a strategic resource;[357] (6) Powell and Dent-Micallef (1997) exploring the linkages between IT, IT performance and firm performance; and finally, (7) Wright et al. (1998) in using both financial performance and HR effectiveness as the dependent variables to examine how the involvement of the HR executive

[351] Cf. Ray et al. (2004), p. 31f.
[352] Ray et al. (2004), p. 24.
[353] Cf. Anand/Singh (1997); Bennett et al. (1998); Brews/Hunt (1999); Combs/Ketchen (1999); Dhanaraj/Beamish (2003); Fey et al. (2000); Lee/Miller (1999); Powell (1995); Powell/Dent-Micallef (1997); Ray et al. (2004); Wright et al. (1998).
[354] Cf. Ray et al. (2004), p. 31f.
[355] Cf. Bennett et al. (1998), p. 6f.
[356] Cf. Brews/Hunt (1999), p. 895.
[357] Cf. Powell (1995), p. 25.

impact managers' evaluations of the effectiveness of the HR function, and of operating unit performance in petrochemical refineries.[358]

Regardless of whether or not performance is being used at an aggregated or disaggregated level, March and Sutton (1997) point out that researchers, overall, tend to ignore the ***complications*** of using such a formulation to characterize the causal structure of performance phenomena. These complications contain the causal complexity surrounding performance (*feedback loops*), and the limitations of using data based on retrospective recall of informants (*retrospective bias*).[359] Here, only about 20% (see Table 17) of the studies tried to control these aspects. For instance, Barnett et al. (1994) emphasize that performance itself is best understood in dynamic, evolutionary terms. Therefore, the authors – using a longitudinal research design and a partial adjustment model – rely on year-to-year changes in return on average assets (ROAA) as the dependent variable.[360] Their data shows that performance was in fact not stable over time and, therefore, a cross-sectional analysis of this data would have missed the interesting dynamics at play. Similarly, Daily et al. (2000) point at the necessity to rely on multiple measures and, therefore, include return on assets (ROA) and return on investment (ROI) as accounting measures, and market-to-book ratio as market measure. Whereas accounting-based measures reflect past and present firm performance, a market measure such as market-to-book ratio provides an indication of the firm's future performance potential.[361] In analyzing the differences in performance outcomes between diversification-oriented acquisitions and consolidation-oriented acquisitions, Anand and Singh (1997) operationalize performance through two different time-related measures: one ex ante measure (the abnormal stock market returns associated with the announcement of acquisitions) and one ex post measure (pretax operating cash flows normalized by the market value of assets before and after the acquisition is implemented).[362] Also, Deephouse (1999), who uses a lagged dependent variable as control variable to reflect the possibility that the effects of changes in the dependent variables are distributed over multiple time periods.[363] Hence, the authors control mechanisms by which performance in one period could be affected by performance in previous periods (i.e., feedback loops).

[358] Cf. Wright et al. (1998), p. 22.
[359] Cf. March/Sutton (1997), p. 698; Chakravarthy (1986), p. 444.
[360] Cf. Barnett et al. (1994), p. 12.
[361] Cf. Daily et al. (2000), p. 519.
[362] Cf. Anand/Singh (1997), p. 108.
[363] Cf. Deephouse (1999), p. 156.

Since lower-level performance operationalizations tend to rely on subjective measures, these measures could especially suffer from retrospective recall effects of informants, i.e., recall that reconstructs the past to match with the current performance situation.[364] Because performance information itself has an influence on subjective memories, perceptions, and weightings of possible causes of performance, researchers should control such effects. For instance, McGrath et al. (1995) measure project performance as described above (see Table 20) and, theoretically, by setting easy objectives, a project team could have generated a high score, regardless of actual performance. To control this effect, the authors developed an 'ambitiousness' variable. Respondents were requested to assess whether each objective for the project should be increased, decreased, or remain the same and the sum of their responses was used to create an 'ambitiousness score' (control variable).[365] Similarly, Bennett et al. (1998) use both objective and perceptual sources in order to minimize the influence of the reporting biases inherent in each source; consequently, they focused on a financial measure that was perceptually based and an operational measure that was objectively based.[366]

To summarize, within the 192 empirical studies the operationalizations of performance and its conditions show that: (a) even though authors equally argue both, rents and competitive advantages, the majority concentrates on operationalizing *rents* as the dependent variable; (b) there *are* several empirical operationalization measures for rents, whereas one of the better, more accurate measures is considered to be Tobin's *q*; (c) about 53% of the studies tried to capture the sustainability of performance; (d) while exploring a resource's impact on performance it is wise to survey different aggregation-levels, in order to detect and outline the overall net effect; and (d) it is also important to acknowledge possible complications such as feedback-loops and retrospective bias while using performance measures.

3.2.2.2 Guidelines for Measuring Performance

With regard to the ***dependent variable*** of resource-based studies, i.e., (sustainable) rents, the examples outlined in Table 19 and Table 20 depict the variety of possibilities. Yet, as previously discussed, not all measures seem suitable for the purpose of measuring rents. Moreover, while operationalizing performance, researchers should acknowledge several aspects to improve the operationalization quality of the construct. In order to develop guidelines in terms of best practices, this sections starts with outlining benefits and limitations of alternative approaches, in this connection. Here, I revert to the results from Venkatraman

[364] Cf. March/Sutton (1997), p. 699.
[365] Cf. McGrath et al. (1995), p. 260.
[366] Cf. Bennett et al. (1998), p. 10.

and Ramanujam's (1986) study on the comparison of different approaches regarding the measurement of business performance, while also integrating results and lessons learned from the review to facilitate guidelines for measuring this construct. Furthermore, I especially focus on suitable measures for capturing rents, emphasizing Tobin's *q*, as already addressed.

First of all, on the topic of pros and cons regarding alternative measurement approaches, Venkatraman and Ramanujam (1986) distinguish between financial indicators and operational non-financial indicators within their study on measuring performance, and argue the benefits and limitations of using either primary data (e.g., data collected directly from organizations) or secondary data (e.g., data from publicly available records).[367] The following Table 21 briefly summarizes their results, extended by outlining possibilities to ensure the use of several levels (i.e., firm- and lower-level performance) as well as prevention of retrospective bias.[368]

	FINANCIAL DATA	OPERATIONAL DATA
PRIMARY SOURCES	**Benefits:** ▪ Provides self-reported financial data with less problems of external interpretation and aggregation of data. ▪ Can be used at several performance levels. ▪ Possibilities for identifying firm- and lower-level performance measures **Limitations:** ▪ Data is likely to be biased (retrospective bias) ▪ Complete data may not be available due to confidentiality reasons. **Guidelines:** ▪ Choose target respondents based on specific criteria (position, function, etc.). ▪ Use multiple respondents to examine the extent of systematic bias as well as minimize measurement error.	**Benefits:** ▪ Provides some basis to include considerations of performance in research design. ▪ Less likely to be influenced by reasons of confidentiality, sensitivity, etc. ▪ Possibilities for identifying firm- and lower-level performance measures **Limitations:** ▪ Data is likely to be biased (retrospective bias) ▪ Relationship to financial performance not known. **Guidelines:** ▪ Choose target respondents based on specific criteria (position, function, etc.). ▪ Use multiple respondents to examine the extent of systematic bias as well as minimize measurement error.

[367] Cf. Venkatraman/Ramanujam (1986), p. 804.
[368] Cf. Venkatraman/Ramanujam (1986), p. 808ff.

	FINANCIAL DATA	OPERATIONAL DATA
SECONDARY SOURCES	**Benefits:** ▪ Provides data on financial aspects which may not be otherwise available. ▪ No retrospective bias. **Limitations:** ▪ Differences in accounting policies may limit its use for comparison purposes (unless stock-market indicators are adopted). ▪ Cannot be meaningfully used due to aggregation problems. ▪ Difficulties in providing data for lower-level performance. **Guidelines:** ▪ Examine the feasibility of using stock-market indicators as well as the measure of return on value added (ROVA) in view of its 'invariance' across industrial contexts. ▪ Use industry-relative performance when multiple industries are included in the sample. ▪ Assess differences in accounting policies when feasible.	**Benefits:** ▪ Provides performance data when financial data either may not be available or may be inappropriate. ▪ No retrospective bias. **Limitations:** ▪ Limited data availability on various indicators to develop measures. ▪ Data may be industry-specific and may not lend itself to multi-industry studies. ▪ Relationship to financial performance not known. ▪ Difficulties in providing data for lower-level performance. **Guidelines:** ▪ Use industry as the reference point for developing measures. ▪ Attempt to define concepts such as market-share, etc., as consistently as possible across industries.

Table 21: Benefits and Limitations of Alternative Approaches for Measuring Performance

Overall, Venkatraman and Ramanujam (1986) conclude that to significantly improve the operationalization quality of the performance construct, researchers should rely on measures that reflect a broader conceptualization of the construct space as well as address methodological concerns of convergence of operationalizations across distinct methods.[369] In other words: To provide a more comprehensive operationalization of performance, researchers should use both financial and operational indicators,[370] whereas to provide scope for assessing convergent validity to enhance the quality of measurement, researchers should use data from both primary and secondary sources. Regarding the latter, scholars then need to examine the interchangeability of operationalizations, i.e., guarantee the convergence of operationalizations. Furthermore, researchers should try to acknowledge the complications of using performance measures as described in chapter 3.2.2.1, i.e., control for feedback loops and retrospective biases and, finally, rely on different performance-levels for the dependent variable. Hence, for operationalizing performance within empirical resource-based studies, the following suggestions are made:

[369] Cf. Venkatraman/Ramanujam (1986), p. 805.
[370] Similarly, Chakravarthy (1986) concludes in his study on measuring strategic performance differences within the computer industry that conventional profitability criteria are incapable of distinguishing differences in strategic performances and thus other criteria need to be evaluated to differentiate between "excellent" and "non-excellent" firms. Cf. Chakravarthy (1986), p. 442.

(1) ***Enlarging the construct space:*** Avoid single dimension operationalization approaches and rather operationalize several aspects of performance simultaneously, i.e., accounting returns (e.g., ROA, ROS), stock market (e.g., market-to-book value, Tobin's q), and growth measures (e.g., market share, sales growth) as well as operational performance measures (e.g., operations outcomes, service outcomes, human resource outcomes)[371]

(2) ***Acknowledging the construct complexity:*** Control for feedback loops by including past, present, and future performance measures. Check for retrospective bias by incorporating matching control variables.

(3) ***Minding the construct levels:*** Evaluate the chain of cause and effect for high to lower level performance, and incorporate different performance levels as dependent variables.

(4) ***Enhancing the measurement quality:*** Provide scope for assessing convergent validity by using data from both primary and secondary sources.

(5) ***Assessing the data convergence:*** Examine convergence between data from alternate sources (i.e., if both primary and secondary data sources are used, check if the different measures derived from these sources are correlated and also proportional to each other). If convergence is not given, examine the level of measurement error in the different operationalizations (e.g., using structural equation models).[372]

Besides these useful guidelines for operationalizing performance, it is important to note that in relation to rents, not every performance measure seems suitable for this purpose. Following Montgomery and Wernerfelt (1988), critics are basically arguing that simple accounting measures do not account for differences in systematic risk, temporary disequilibrium effects, tax laws, and arbitrary accounting conventions.[373] Similarly, Chakravarthy (1986) who asserts the following problems with financial accounting measures: "…(1) scope for accounting manipulation; (2) under-valuation of assets; (3) distortions due to depreciation policies, inventory valuation and treatment of certain revenue and expenditure items; (4) differences in

[371] Cf. Combs et al. (2005), p. 274. "… an unidimensional composite of a multidimensional concept such as business performance tends to mask the underlying relationships among the different subdimensions." Venkatraman/Ramanujam (1986), p. 807. "… instead of searching for that single measure which most significantly determines performance, a multi-factor model of performance should be used […] 'excellence' is a complex phenomenon requiring more than a single criterion to define it." Chakravarthy (1986), p. 446. "No single profitability measure seems capable of discriminating excellence. Moreover, accounting data that are typically used to construct these measures capture past performance or historical trends. Strategic performance needs a more futuristic measure." Chakravarthy (1986), p. 453. Chakravarthy suggests that excellence "is not reflected in the maximization of performance along any single dimension, but rather in the ability of the firm to simultaneously maintain several performance parameters within safe limits." Chakravarthy (1986), p. 455.

[372] Cf. Venkatraman/Ramanujam (1986), p. 812. See Bagozzi (1980) and Joreskog/Sorbom (1979) for an overview of structural equation models, as well as Venkatraman/Ramanujam (1986).

[373] Cf. Montgomery/Wernerfelt (1988), p. 626.

methods of consolidating accounts; and (5) differences due to lack of standardization in international accounting conventions."[374] Furthermore, these measures only represent the firm's history while neglecting its future performance potential.[375]

To overcome these deficits of ordinary accounting measures, scholars such as Montgomery and Wernerfelt (1988), Chakravarthy (1986), and Lindenberg and Ross (1981) recommend that Tobin's *q* (defined as the ratio of market value to the replacement cost of the firm) is a more appropriate measure. Through combining capital market and accounting data, Tobin's *q* implies equilibrium returns, implicitly uses the correct risk-adjusted discount rate, and impairs tax law and accounting convention distortions.[376] Here, I will briefly restate Montgomery and Wernerfelt's (1988) definition of Tobin's *q*:

> In principle, the numerator in q can be decomposed into the sum of the firm's capitalized income streams. While many decompositions are possible, the literature (Lindenberg and Ross, 1981; Salinger, 1984; Smirlock et al., 1984) suggests that we decompose the market value of the firm into the value of its physical assets, the value of its intangible assets, the capitalized rents from collusive relationships, capitalized Ricardian rents, and possibly, disequilibrium effects. As defined, the denominator of q is the replacement cost of a firm's assets. In practice this has come to mean the replacement value of a firm's physical assets. The extent to which q differs from one is thus a measure of the extent to which the firm's capitalized rents differ from the fair market price of its physical assets.
>
> From this, we can write q as
>
> q = M/Vp = 1 + (VI + VC + VR + VE) / Vp*
>
> M = the market value of the firm;
> Vp = the (replacement) value of physical assets;
> VI = the value of intangible assets purchased by the firm;
> VC = the value of collusive relationships with competitors:
> VR = the capitalized Ricardian rents; and
> VE = disequilibrium effects.
>
> (Montgomery and Wernerfelt (1988), p. 627)

In other words, *q* is a much more suitable measure for rents than accounting returns. The latter, even if properly assessed, do not provide information about economic rates of return.[377]

3.2.3 Context Variables: Markets

On the subject of the operationalization of the central construct ***markets***, this section is structured as follows: *First*, results from the review on the 192 articles will reveal the variety of context variables regarding the different environment and industry conditions to which markets are subjected. *Second*, emphasizing the conditions of information asymmetry and supply inelasticity, examples will be provided from the review on how to operationalize these

[374] Chakravarthy (1986), p. 443.
[375] Cf. Chakravarthy (1986), p. 444.
[376] Cf. Montgomery/Wernerfelt (1988), p. 627.
[377] Cf. Fisher/McGowan (1983), p. 82. For *q* calculating procedures see Lindenberg/Ross (1981), p. 10f.

two conditions. *Third*, in reference to the criticism in chapter 2.5 to always acknowledge the context while evaluating the resource's value, I will also outline exemplary empirical studies on integrating context. *Finally*, guidelines will be developed on how to operationalize these market conditions.

3.2.3.1 Operationalizing Markets

Results from the review on the 192 articles show that merely 55% of the studies integrate context, i.e., control industry and/or environmental effects, or operationalize these effects in some other way.[378] Table 22 briefly consolidates some interesting facts and findings in this connection:

Context-Setting*	**# of Tests**	**% of Tests**
Multiple Industries	**113**	**59%**
Single Industry	**78**	**41%**
Context Control Variables**	**# of Tests**	**% of Tests**
Integrating Control Variables	**106**	**55%**
Industry Dummies	34	-
Environment Dummies	15	-
Industry Variables***	35	-
Environment Variables***	22	-

* One study has no context-setting, i.e., the experiment of Knez & Camerer (1994).
** Note that one study can be allotted to more than one category.
*** The variety of variables is presented within Table 23.

Table 22: Operationalizing Context within Empirical Tests of RBT

As Table 22 reveals, 41% of the studies looked at ***single industries*** within their studies, whereas 59% controlled their effects for ***multiple industries***. Applying multiple industry-settings guarantees for a better generalization of results, nevertheless, researchers still need to focus on the idiosyncratic nature of each industry. Rouse and Daellenbach (1999) specifically argue the importance of selecting a single industry: An industry does share strategic factor markets and industry attributes generally affect strategy decisions as well as organizational factors such as culture.[379] Also, the authors assert that it is questionable whether rents based on unique strategic resources can be generalizable at all.[380]

Regarding industry- and environmental control variables, researchers either relied on *dummies* or on specific *variables* to integrate context. Table 23 gives an overview of the variety of the different context variables used within the empirical studies (*industry structure*

[378] The majority of the remaining 45% of the studies provide at least an extensive argumentative industry- and environment assessment, even though they do not statistically test it.
[379] Cf. Rouse/Daellenbach (1999), p. 489.
[380] Cf. Rouse/Daellenbach (2002), p. 966.

variables (e.g., concentration, growth) and industry specific *environmental variables* (e.g., dynamism, munificence, complexity).

INDUSTRY VARIABLES	
VARIABLE	**OPERATIONALIZATION**
Competition	▪ number of products/strategic group members in the market per year; ▪ scale of 14 industry items based on Porter's (1980) industry analysis framework; these items were divided into two variables, entry barriers and rivalry (index for industry differences); ▪ *e.g., Afuah, 2000; Barnett, Greve, & Park, 1994; Powell, 1995; Tripsas, 1997*
Concentration	▪ similar firms, measured through SIC; ▪ founding density; ▪ Herfindahl index, based on the market share of the top four firms; ▪ items on market concentration and number of potential entrants; ▪ *e.g., Delios & Beamish, 1999;Douglas & Ryman, 2003; Gimeno, 1999; Robins & Wiersema, 1995; Wiggins & Ruefli, 2002*
Growth	▪ market growth of deposits (annual percent change in real total market deposits); ▪ net capital investment expenditure over total assets to measure long term growth opportunities; ▪ growth rate (percentage growth in sales from the year before); ▪ market stage (emergent, growth, mature); ▪ *e.g., Afuah, 2000; Capron, Dussauge, & Mitchell, 1998; Delios & Beamish, 1999; Tripsas, 1997; Vicente-Lorente, 2001*
Industry Resource Characteristics	▪ industry human capital intensity = index made up of three measures: education (years of schooling), professionals (percent of the target's industry employment that is made up of doctors, engineers, lawyers, managers, mathematical scientists, and social scientists), and training (number of hours of formal and informal training); ▪ average industry profits and industry shipments; ▪ industry resources characteristics (R&D intensity, fixed asset intensity, advertising intensity, capital intensity); ▪ law regulations implying scarcity of certain resources ▪ *e.g., Coff, 2002; Gupta & Govindarajan, 2000; Harrison, Hall, & Nargundkar, 1993; Maijoor & Witteloostuijn, 1996*
ENVIRONMENTAL VARIABLES	
VARIABLE	**OPERATIONALIZATION**
Complexity	▪ items such as = complex business environment, actions affect competitors, involvement and/or approval of the government, possibility of control of property, means of resolving disputes, limitations in repatriation of capital, management directives, investment incentives, fiscal rates, government control of trade, guarantees in case of nationalization, country risk; ▪ items such as = diversity (To what extent do you think the following sectors (i.e., competitors, customers, suppliers, regulatory, and socio-culture) have been diverse (i.e., how many different factors and issues does your firm have to deal within each sector, e.g., types of customer groups?)) and heterogeneity (To what extent do you think these multiple factors and issues within the same category are different from each other?) ▪ measured by using a correlated surrogate of the Hirschman-Herfindahl index (MINL); ▪ *e.g., Hart & Banbury, 1994; King & Zeithaml, 2001; Luo & Peng, 1999; Youndt, Snell, Dean, & Lepak, 1996*

ENVIRONMENTAL VARIABLES	
VARIABLE	**OPERATIONALIZATION**
Dynamism	▪ turbulence of environment (impact of regulations, law changes, etc.), i.e., dynamism measured with items such as = little need to change marketing practices, slow product obsolescence, competitors' actions easy to predict, consumer demand easy to predict, production technology changes slowly, technological changes easy to predict, consumer demand is stable; ▪ predictability (To what extent do you think the following sectors (i.e., competitors, customers, suppliers, regulatory, and socio-culture) have been unpredictable?) and variability (To what extent do you think these sectors have undergone major changes over the last five years?); ▪ antilog of the standard error term from each regression equation (degree of change in industry sales) ▪ *e.g., Geringer, Tallman, & Olsen, 2000; Hart & Banbury, 1994; Luo & Peng, 1999; Youndt, Snell, Dean, & Lepak, 1996*
Munificence	▪ the extent to which the environment can sustain growth (i.e., munificence): provide for circumstances that enable firms to increase their knowledge (a higher concentration of similar firms, specialized suppliers, such as research universities, and a large pool of trained labor); ▪ labor market munificence = in regard to HRM, a key source of uncertainty involves the adequate supply of qualified labor; as qualified labor becomes more scarce, uncertainty increases ▪ items such as = market will grow; 12 month business outlook good; ▪ regression of the natural log of sales against time; ▪ measure derived from the equation for computing industry volatility; the slope coefficients from the regression were divided by industry mean value of sales; ▪ *e.g., Bennett, Ketchen, & Schultz, 1998; Bergh, 1998; De Carolis & Deeds, 1999; Hart & Banbury, 1994; King & Zeithaml, 2001; Wiklund & Shepherd, 2003; Youndt, Snell, Dean, & Lepak, 1996*

Table 23: Operationalization of Industry and Environment Variables

Besides these variables, another common way to acknowledge context is to survey industry codes, i.e., codes based on industrial classification systems.[381] For instance, researchers within the US rely on SIC (Standard Industrial Classification) Codes, which in themselves give information of the aforementioned industry variables, whereas currently an advancement of SIC has emerged, called NAICS (North American Industry Classification System).[382] NAICS basically addresses the problems of SIC regarding the general selection problem and the diversified firm problem.[383] In Europe, researchers rely on NACE (derived from the French 'Nomenclature statistique des Activités économiques dans la Communauté Européenne', i.e., Statistical classification of economic activities in the European Community), used to designate the various classifications of economic activities since 1970 by the European Union.[384] Through integrating industry codes, researchers are indirectly controlling information on an industry's concentration, its growth, its dynamism, etc.

[381] Cf. Dess/Beard (1984), p. 53f.
[382] Cf. http://www.census.gov/epcd/www/naics.html (14.07.04). For differences between NAICS and SIC see http://www.census.gov/epcd/www/naicsdev.htm.
[383] Cf. Robins/Wiersema (1995), p. 281; Wiggins/Ruefli (2002), p. 87f.
[384] Cf. http://www.un.org/english/.

According to the two market conditions of *supply inelasticity* and *information asymmetry* as outlined within chapter 2.3.3.3, some of the variables depicted in Table 23 are suitable measures in this connection. As previously discussed, ***information asymmetry*** increases with high environmental uncertainty. Following Dess and Beard (1984), the degree of *environmental uncertainty* depends upon three different conditions: it increases with high dynamism and high complexity, and is affected by industry concentration,[385] i.e., environmental uncertainty decreases with high industry concentration and increases with lower industry concentration.[386] Regarding the review, examples of the studies attending to these measures can be found within Table 23.[387] First of all, studies are controlling *dynamism*, measured through either stability-instability states by looking at turnover, absence of pattern, and unpredictability (i.e., the rate of environmental change (volatility) and unpredictability of environmental change) or turbulence as the degree of interconnection among environmental elements.[388] Indicators both reflect steady growth or predictable cyclicality as well as discontinuities.[389] Second, authors are controlling *complexity*, defined as the heterogeneity and range of an organization's activities. It can be stated that the greater the uncertainty the greater the information processing requirements, i.e., the increase in structural complexity of the environment will increase the need for strategic activities.[390] Third, scholars are controlling *industry concentration*, focusing on concentration indices and market shares within an industry to assess the extent of realized or potential collusions.[391]

According to chapter 2.3.3.3, ***supply inelasticity*** depends upon a resource's limited availability due to resources being either fixed or quasi-fixed (non-transferability or non-/imperfect tradability). The *fixity of a resource* can be indicated through the munificence degree for this resource. For example, Bennett et al. (1998) capture the labor market

[385] Industry concentration as an industry structure variable according to Porter (1980), considers the number and the size distribution of competing firms within an industry. Cf. Porter (1980).
[386] Cf. Dess/Beard (1984), p. 55; Kotha/Nair (1995), p. 499. See also chapter 2.3.3.3.
[387] Here, the focus is on the operationalization of these variables to capture environmental uncertainty; in chapter 3.3 examples will be outlined on how researchers employed these measures to implicitly account for resource conditions.
[388] Cf. Dess/Beard (1984), p. 56. Kotha and Nair (1995) refer to an additional term within their conceptualization of environmental uncertainty, i.e., *technological change*. Yet, since their arguments basically refer to states of environmental *change*, their notion is included within the concept of dynamism. Cf. Kotha/Nair (1995), p. 499.
[389] Cf. Keats/Hitt (1988), p. 579.
[390] Cf. Keats/Hitt (1988), p. 579; Dess/Beard (1984), p. 56; Aldrich (1979), p. 72. For example, "organizations competing in industries that require many different inputs or that produce many different outputs should find resource acquisition or disposal of output more complex than organizations competing in industries with fewer different inputs and outputs." Dess/Beard (1984), p. 57.
[391] Cf. Kotha/Nair (1995), p. 499; Dess/Beard (1984), p. 58. Note that these three indicators for environmental uncertainty can be interconnected. Keats and Hitt (1988), for instance, adopt an indicator for the complexity dimension from Grossack's (1965) dynamic measure of industry concentration, which provides for comparability across a variety of diverse industry environments. For more details, see Keats/Hitt (1988), p. 596f.

munificence to imply a specific resource scarcity, i.e., a resource's supply inelasticity.[392] The *quasi-fixity of a resource* basically results from specific resource characteristics (certain immobility-barriers due to certain inimitability conditions). Yet, there are also some market characteristics, such as regulations, which can indicate a quasi-fixity of a resource and, hence, resource's supply inelasticity. For instance, Majoor and Witteloostuijn (1996) refer to specific law regulations for register accountants, i.e., for a particular group of human resources, and thereby argue their limited availability.[393]

Overall, the ***importance to control for context*** is without question: "The failure to control for industry […] could hopelessly confound results and confuse efforts to sort out any contextualized locus of advantage. Context is important for understanding and for applying advantage."[394] Following the recent debate on the necessity of a systematic description of boundary conditions, it becomes evident that in resource-based research scholars need to interpret their results regarding the firms' industry and environment. In discussing the boundaries of the RBT, Priem and Butler (2001) criticize that, so far, there has been little effort to establish appropriate contexts for the RBT.[395] Yet, these contexts are decisive when it comes to the generalizability of findings as well as the prescription potential.[396] Furthermore, Dess et al. (1990) point out that enough findings support the impact of industry structural characteristics on strategic resources and performance.[397] Thus, following Priem and Butler (2001), it is important for researchers to try hypothesizing contexts within which particular resources are more or less valuable.[398] Barney (2001), supporting their assertion, points out that theorists must consider market conditions under which a firm's resources will or will not be valuable, whilst examining the implications of resource-based logic.[399] Similarly, Combs and Ketchen (1999) assert that the strategic value of a resource is usually industry-specific, and, thus, could only be properly investigated when informed by knowledge about the industry.[400] Sakakibara (2002), exploring the firm's decision to participate in R&D consortia, emphasizes the importance of taking industry-specific factors into account, because otherwise

[392] Cf. Bennett et al. (1998), p. 9.
[393] Cf. Majoor/Witteloostuijn (1996), p. 561ff.
[394] Rouse/Daellenbach (1999), p. 491.
[395] Cf. Priem/Butler (2001), p. 32.
[396] Cf. Priem/Butler (2001), p. 31f; Godfrey/Hill (1995), p. 530; Rouse/Daellenbach (1999), p. 491.
[397] Cf. Dess et al. (1990), p. 9. "Environments affect organizations through the process of making available or withholding resources, and organizational forms can be ranked in terms of their efficacy in obtaining resources." Aldrich (1979), p. 61. Also Ambrosini and Bowman (2001) on the subject of resources' value: "In face of environmental changes tacit skills may become obsolete." Ambrosini/Bowman (2001), p. 826.
[398] Cf. Priem/Butler (2001), p. 31; see also Rouse/Daellenbach (1999), p. 489; King/Zeithaml (2001), p. 79; Collis/Montgomery (1995), p. 120.
[399] Cf. Barney (2001), p. 43.
[400] Cf. Combs/Ketchen (1999), p. 871.

this line of research could miss the underlying industry forces that have led the firms to possess or acquire resources in the first place.[401] In other words, a resource might be strategic for context 'A', yet, not for context 'B'.[402] As Miller et al. (1997) succinctly resume: "…we need to be much more precise in specifying the contexts in which our findings might apply".[403]

However, regarding the review, merely 55% of the studies control for industry and/or environmental effects. For instance, Miller and Shamsie (1996) explicitly consider environmental effects through analyzing the *value* of property- vs. knowledge-based resources of US film studios facing two different environments, one relatively stable and predictable environment (1936-1950) and another rather uncertain (changing and unpredictable) environment (1951-1965).[404] On the other side, Barnett et al. (1994) demonstrate that the *development* of competitive capabilities can depend on industry and/or environmental effects. In investigating the trade-off between strategic positioning and competitive abilities in achieving performance, Barnett et al. predict that single-unit firms will develop into better performers due to competitive capabilities when they are exposed to competition, whereas multi-unit firms will not demonstrate learning of this sort because they adopt a strategy and structure to attain a protected market position at the expense of learning. The results supply evidence for this assumption, emphasizing the impact of industry and environmental effects on capability development.[405]

In addition to these examples, Table 24 elucidates studies which particularly tried to conjecture context. Here, researchers do not only control possible industry and/or environmental effects, instead they focus explicitly on the relationship between industry and/or environment, resources, and performance. Those examples thus confute Priem and Butler's (2001) criticism that "…little effort to establish appropriate contexts for the RBV has been apparent."[406]

To sum up, within the 192 empirical studies the operationalizations of *markets* and their *conditions* show that: (a) *merely 55%* controlled for industry and environmental influences,

[401] Cf. Sakakibara (2002), p. 1034.
[402] Cf. Brush/Artz (1999), p. 246. Farjoun (1998), for example, rely on the so-called industry skill profiles: "The first step in building the skill-based classification is the construction of industry skill profiles. To measure human skill requirements, we used the Occupational Employment Survey (OES) conducted by the U.S. Department of Labor Statistics. Indicators of both the different types of human expertise needed in an industry and the extent to which they are required." Farjoun (1998), p. 616.
[403] Miller et al. (1997), p. 76.
[404] Cf. Miller/Shamsie (1996).
[405] Cf. Barnett et al. (1994).
[406] Priem/Butler (2001a), p. 32.

yet (b) there are some exemplary contributions *establishing context conditions* regarding RBT; and (c) several measures exist to represent the (proposition-relevant) market conditions of supply inelasticity and information asymmetry.

Authors	Research Question	Context-based Operationalization	Results
Arora & Gambardella (1997) *(cross-sectional research design)*	What is the distinctive role of market size, and how does market size conditions the competencies of the leading firms in an industry? Theory of imperfect competition implies that market size has a more important role when the performance is based on narrow, product-specific competencies, rather than generic competencies. The study tests this assertion by comparing the service industries that supply engineering, and construction contracting to oil-refining and petrochemical plants in the US (larger market) and Western Europe and Japan (smaller fragmented markets).	*Market size* = focusing on market size within multiple institutional environments – USA, Western Europe and Japan → ***competency development and market size***	Results suggest that market size is important even if there are no economies of scale. As long as firms differ in their competencies, and differences in firm competencies tend to persist, larger markets will have more efficient firms. This effect is more pronounced for firms with narrow, product-specific competencies.
Barnett, Greve, & Park (1994) *(longitudinal research design)*	The role of managers concerning performance achievement decisions regarding the trade-off between strategic positioning and competitive capabilities: competitive forces spawn distinctive competencies, but managers attempt to restrict these forces when they seek positional advantage. Single-unit firms will develop into better performers when they are exposed to competition. Multi-unit firms will not demonstrate learning of this sort, because they adopt a strategy and structure that attain protected market position at the expense of learning.	*Competition* = includes aspects of each bank's history thought to contribute to its development (measures of each organization's competitive history – the average annual density of rivals faced by the bank in its local markets over its previous history); because the nature of competition changed as deregulation began in 1980, the competition variable is calculated separately for the post-1980 period and for the period from 1970 to 1980 → ***competitive capability development and market competition***	Unit banks that have survived more competition during the deregulated era (since 1980) perform better as a result, while no such effect is found for branch systems. As predicted, unit banks which survived more competition during the regulated era (before 1980) perform worse as a result – again an effect that is not found for branch systems. The findings imply that among unit structures, each organization's performance today will depend on the historical path it followed in the past. Two organizations facing identical market conditions now should perform quite differently if they have faced different degrees of types of competition in the past.

Authors	Research Question	Context-based Operationalization	Results
Brush & Artz (1999) *(cross-sectional research design)*	The authors investigate the contingencies which define valuable resources and capabilities in professional veterinary medical services.	*Two different environments* = one rather competitive due to large pet franchisers in 'Far West' and one relative stable referred to as the 'other regions'; dummy variable which is 1 if the practice is in the far west region, and 0 if it is in any other region (Northwest, Western, Middle West, Northeast, Southeast). ***→ value of resources and capabilities for different degrees of market competition***	Contingent combinations of firm-specific resources determine the performance of veterinary practices in dependence of the competitive environment.
Carmeli (2004) *(cross-sectional research design)*	Assessing core intangible resource, i.e., identifying the most valuable, rare, inimitable, and non-substitutable intangible resources for successful and less-successful firms competing in an industry of low level of uncertainty and instability (et. vice versa).	*Two different environments* = to control for industry effects the firms were grouped by their perception of the degree to which their industry is uncertain and unstable; the firms were classified according to their annual growth and perceived environmental uncertainty and instability; two categories of successful firms were created: (1) growing firms in a certain and stable environment (2) growing firms in an uncertain and unstable environment. In addition, two identical categories of less successful firms were formed in order to enable a comparison between growing and slow-growing firms. ***→ value of resources and capabilities for different environments***	Fast-growing firms that compete at a low degree of industry uncertainty and instability perceive planning capability as a core resource that may produce SCA, whereas slow-growing firms perceive four resources as a source of SCA creation, i.e., the ability to raise funds, know-how, managerial competence, and product/ service reputation. Fast-growing firms that compete at a high level of industry uncertainty and instability perceive three core resources for they withstood all of the four conditions for SCA creation, i.e., the ability to raise funds, managerial competence, and human capital, whereas slow-growing firms perceive only one core resource, i.e., the ability to raise funds.

Authors	Research Question	Context-based Operationalization	Results
Helfat (1997) *(longitudinal research design)*	When firms seek to alter their stock of knowledge in response to change in the external environment, do such efforts depend on the firms' existing stocks of complementary know-how and other assets, and if so, how?	*Two periods of change* = two major oil price increases (one in 1973-74 and one in 1978-79); alternative fuels technologies appeared; because the oil companies spent substantial sums on alternative fuels R&D only during the middle to late 1970s and early 1980s, this period provides a unique opportunity to examine the impact of complementary know-how and other assets on dynamic knowledge accumulation via R&D in these speculative technologies. ***→ influence of complementary technological knowledge and physical assets on dynamic capability accumulation against the background of changing environments***	In response to rising oil prices, firms with larger amounts of complementary technological knowledge and physical assets also undertook larger amounts of R&D on coal conversion (a synthetic fuels process). Dynamic capabilities enable firms to stay competitive through changing market conditions.
Kraatz & Zajac (2001) *(longitudinal research design)*	How (and why) might differences in organizations' resource endowments affect their propensity for strategic change under turbulent conditions, which generally appear to necessitate it? Should one expect organizations richly endowed with historically valuable resources to be more, less, or equally likely (relative to their less well-endowed peers) to change strategies when confronted by environ-mental shifts? How (and why) might differences in resource endowments moderate the relationship between strategic change and performance? Should one expect that such endowments will weaken, strengthen, or have no effect on the performance benefits associated with strategic adaptation?	*Turbulent environments* = examination of how resources affect strategic change and performance in turbulent environments – research setting shows environmental trends which generally impel organizations toward strategic change. ***→ influence of organizational resources on strategic change and performance in turbulent environments***	Results indicate that organizations possessing greater stocks of historically valuable resources were much less likely to engage in adaptive strategic change, but also that this resource-driven disinclination towards change tended to have a benign or even beneficial effect on performance.

Authors	Research Question	Context-based Operationalization	Results
Luo & Peng (1999) *(cross-sectional research design)*	Does organizational learning as measured by experience in a host country affect international expansion performance? If so, does such a relationship between experience and performance hold over time? How do the environmental forces in the host country affect such a relationship?	*Different environments* = impact of host-country experience on performance under certain environmental conditions (hostility, dynamism (predictability and variability), and complexity (diversity and heterogeneity)). ***→ impact of host-country experience on performance under certain environmental conditions***	Based on a survey of 108 MNE subunits operating in China, results show that the intensity and diversity of host country experience is an important predictor of subunit performance. While the positive effect of the intensity of experience on performance diminishes over time, the impact of the diversity of experience on performance remains unchanged. Moreover, for MNEs experiencing greater environmental dynamism, complexity, and hostility, there is a stronger positive relationship between experience and performance.
Miller & Shamsie (1996) *(longitudinal research design)*	How do property-based and knowledge-based resources contribute to performance under different environmental conditions (stable and predictable vs. changing and unpredictable)?	*Two different environments* = considering environmental effects by analyzing the importance of property- vs. knowledge-based resources of US film studios facing two different environments, i.e., one relatively stable and predictable environment (1936-1950) and another rather uncertain (changing and unpredictable) environment (1951-1965). ***→ value of knowledge-based and property-based resources under different environment conditions***	Property-based resources (in the form of long-term exclusive contracts with stars and theaters) helped performance in stable environments during 1930-50. In contrast, knowledge-based resources (production and coordinative talent and budgets) improved performance after the 1950s.

Table 24: Exemplary Context-based Studies

Authors	Research Question	Context-based Operationalization	Results
Shamsie (2003) *(longitudinal research design)*	In spite of the growing interest in sustainable advantages, there has been little effort by strategy researchers to investigate market dominance. In this paper, the extent of dominance by leading firms is linked to the ability to develop and exploit their reputation as a key resource.	*Industry context* = significance of purchase (industries differ from each other with regard to the significance that consumers attach to the purchase of their products), convergence of tastes (the extent of convergence or similarities in the tastes of their consumers that they have been able to develop), salience of information (industries also differ significantly in the amount of product information that is available through several different types of channels to most existing or potential consumers). ***→ value of reputation under specific industry characteristics***	Results from a wide spectrum of consumer product markets indicate that the advantages that stem from reputation are typically tied to specific industry characteristics. In particular, dominance is more likely to be observed in industries that offer consumer products that are purchased frequently and have lower prices.
Tripsas (1997) *(longitudinal research design)*	Why do incumbent firms sometimes fail drastically in the face of radical technological change yet other times survive and prosper?	*Three periods of technological change* = the author explores the research question by analyzing the technological and competitive history of the industry for a period of over 100 years (1886-1990); the industry has undergone three waves of "creative destruction" (analog phototypesetting (1949), digital CRT phototypesetting (1965), and laser image setting (1976)) where competence-destroying, architectural technological change transformed the industry; incumbents were displaced by new entrants, however, in only one of these three shifts ***→ value of resources and capabilities within periods of technological change***	Balance and interaction of three factors were shown to drive commercial performance of incumbents vs. new entrants in the typesetter industry in 1886-1990: investment, technical capabilities, and appropriability through specialized complementary assets. The lack of investment was not responsible for incumbent failure. Although incumbent products were technologically inferior in all three competence-destroying generations of technology, incumbents were displaced by new entrants in only one of these three generations. When specialized complementary assets unavailable to new entrants retained their value despite a technological shift, incumbents maintained their market position in the new generation of technology.

3.2.3.2 Guidelines for Measuring Markets

Concerning ***market conditions*** and relying on best practices from the review, the following process is suggested, for integrating context within empirical RBT studies:

(1) ***Selection of industry(s):*** In setting industry boundaries within the studies, the applicability of the results increases, because researchers can compare and identify similar settings. Yet, one must also be careful while relying on *industry* boundaries since deciding which firms to include and which to exclude is quite arbitrary. Also, assuming an industry to be stable in terms of competition and technology is not always appropriate. Thus, determining theoretically correct industry boundaries can be very difficult.[407] Here, relying on NAICS (instead of SIC) and NACE might be helpful.

(2) ***Identification of definable strategic time period(s):*** In defining stable strategic time periods, through looking at turning points and significant changes within an industry and its environment, researchers have the possibility to explore alternating effects on, for instance, a resource's value or its inimitability. Thus, Geringer et al. (2000), suggest, that researchers should compare covariance matrices from year to year, to be able to detect if significant changes occurred between groups of years. If those groups of years show no changes, they are suitable for analytical purposes as a whole group. If significant changes are detected between groups of years, which may also be affirmable through evidence of exogenous changes in the system, those groups can each be seen as stable strategic time periods, and thus, should be analyzed separately.[408]

(3) ***Assessment of industry and environmental variables:*** For those industries and time periods that have been selected, context variables should be assessed through secondary databases, expert interviews, questionnaires, etc. For instance, Keats and Hitt (1988) used descriptive statements about environments from annual reports of the firms in the data set as well as two industry experts who applied munificence, instability, and complexity to classify each of the firms as high, medium, or low on each dimension, by evaluating the descriptions of the relevant industries. Then, they assessed the Pearson product-moment correlations between the experts' classifications and the scores assigned to the firms on each dimension.[409] Brews and Hunt (1999), as another example, let respondents self-select

[407] Cf. Barney (2001), p. 47. See Harrigan (1983) for criterion variables useful in segmenting industries.
[408] Cf. Geringer et al. (2000), p. 59f; see also Marcus/Geffen (1998), p. 1147; Van de Ven (1992).
[409] Cf. Keats/Hitt (1988), p. 580.

one of four environments that most closely described their own, ranging from mature and stable to young and highly unstable.[410]

In summary, researchers face the challenge to combine firms that face similar environments, try to establish the resource differences between those firms and then link those differences to the resources' strategic conditions and their impact on sustainable firm performance. And only if a variety of those empirical studies covering various context settings produce results that are supportive of RBT, the theory can be claimed to correspond to reality.[411] In Barney and Mackey's (2005) words: "Of course, it is difficult to generalize this research beyond the specific industry contexts within which it is done. […] Although these papers have limited generality at the level of the specific resources and strategies studied, their results are quite general from a broader perspective. Each of these papers […] show that at least some firm resources have the potential to generate economic value if they are used to create and implement certain strategies. Over time, as more of these quantitative case studies are done, our ability to specify the conditions under which resources can be used to create and implement strategies that create economic value will be enhanced."[412]

3.3 Operationalization of RBT's Central Propositions

In this section, I will provide examples from the review for the six propositions outlined in chapter 2.4.2, i.e., empirical contributions operationalizing and testing these propositions. As previously discussed, most of the studies did only argumentatively assess the resource and factor market conditions, instead of statistically operationalizing independent measures, such as separate measures for value, rareness, inimitability, and non-substitutability. However, since they make the argument according to the propositions, they have been further included in the analysis.

(1) Proposition 1a: Combs and Ketchen (1999)

> ***Proposition 1a:*** *Firms that acquire or develop valuable and rare resources can gain at least temporary economic rents by using them to develop and implement strategies.*

Regarding restaurant chains, Combs and Ketchen (1999) examine inter-firm cooperation and its performance implications in the context of RBT and organizational economics. Whereas the former theory proposes that firms should seek to capitalize on and increase their resources and capabilities, the latter suggests that firms should focus on cost-minimizing. The authors

[410] Cf. Brews/Hunt (1999), p. 894.
[411] Cf. Godfrey/Hill (1995), p. 530.
[412] Barney/Mackey (2005), p. 4f.

assert that firms will rather base their decisions on resource-based concerns, i.e., they argue the predominant importance of strategic resources such as brand name reputation and top management team experience, while deciding to engage in inter-firm cooperation and, also, measure the resources' impact on the success of the restaurant chain. In their paper, Combs and Ketchen derive the following hypotheses and operationalizations:

PROPOSITION 1 A: COMBS AND KETCHEN (1999)	
HYPOTHESES	***H1a:*** Brand name reputation and interfirm cooperation will be negatively related. ***H1b:*** TMT experience and interfirm cooperation will be negatively related. ***H1c:*** Slack capital and interfirm cooperation will be negatively related. ***H4a:*** Brand name reputation and performance will be positively related. ***H4b:*** TMT experience and performance will be positively related. *(H2a-c: OE hypotheses – the influence of exchange conditions on interfirm cooperation; H3: joint influence of resources and exchange conditions on interfirm cooperation; H5: joint influence of resources and exchange conditions on performance)*
RESOURCES	***strategic resources:*** – ***value*** = *brand name reputation*, four items on the expert panel survey; – ***value*** = *top management team experience*, number of years on the job and in the firm of inside directors as of 1992; – ***rareness*** = argumentatively ***resource:*** *slack capital* = highly liquid, existing capital that is available for immediate investment; measured for 1992 as cash and marketable securities divided by the number of outlets in the chain;
PERFORMANCE	***temporary performance:*** – return on assets (financial perspective); – market-to-book value – approximates the stock market's perception of the value of the firm's present and future income and growth potential (stock market perspective) ***(inter-firm cooperation:)*** – percent of growth accomplished through inter-firm cooperation during 1992-1993 (division number of new restaurants built with cooperative partners by the total added to the chain)
MARKETS	***no special assertions, no operationalization***

Table 25: Example Proposition 1a – Combs and Ketchen (1999)

The empirical results partially confirmed the relationship between brand name and performance (hypotheses 4a), i.e., firms with well-respected brand names showed higher performance when ROA was considered, however, revealed no significant results when stock market returns were applied. Furthermore, results showed no support for hypotheses 4b, i.e., top management team experience was not significantly related to either performance measure. Combs and Ketchen argue that maybe experience is not alone sufficient, and that future studies should look into other team characteristics. Finally, their findings showed that publicly-held restaurant chains emphasize resource-based concerns over considerations of

cost-minimizing when deciding whether to engage in inter-firm cooperation (hypotheses 1a and 1c were supported, 1b was non-significant).[413]

(2) Proposition 1b: Markman et al. (2004)

> ***Proposition 1b:*** *Firms that acquire or develop valuable, rare, inimitable, and non-substitutable resources can gain persistent economic rents by using them to develop and implement strategies.*

In the pharmaceutical industry, Markman et al. (2004) explore whether patents can reflect a resource that is simultaneously valuable, rare, inimitable, and non-substitutable. Specifically, the authors address the complexity of measuring the inimitability and non-substitutability condition and their impact on persistent superior performance. In their paper, Markman et al. derive the following hypotheses and operationalizations:

PROPOSITION 1 B: MARKMAN ET AL. (2004)	
HYPOTHESES	***H1:*** Inimitable patents will be positively related to superior performance. ***H2:*** Non-substitutable patents will be positively related to superior performance.
RESOURCES	***patents:*** – ***value and rareness*** = argumentatively – ***inimitability*** = important patents provide monopolistic protection, thus barriers for imitators; importance is operationalized through citation rates (because imitating patents remains illegal, a high citation count suggests that a patent represents a major stumbling block to rivals who seek access to the protected space);operationalized through the # of patent citations; – ***non-substitutability*** = operationalized through the # of claims listed by each patent (claims define the scope of an invention and distinguish its property from the surrounding technological territory; unlike products (many of which are perfectly substitutable), once a technology space is protected by patent, substitution becomes exceedingly difficult, costly, and time consuming)
PERFORMANCE	***persistent performance:*** – non-financial and financial performance measures = superior performance operationalized as firms' new products and net income
MARKETS	***no special assertions, no operationalization***

Table 26: Example Proposition 1b – Markman, Espina, and Phan (2004)

Their results indicate that inimitability is significantly related to firm profitability and new product introductions,[414] whereas non-substitutability is significantly related to new product introductions only. Thus, both hypotheses are being supported.[415]

(3) Proposition 2a: Bennett et al. (1998)

> ***Proposition 2a:*** *Firms that acquire or develop valuable resources which are inelastic in supply can gain at least temporary economic rents by using them to develop and implement strategies.*

[413] Cf. Combs/Ketchen (1999), p. 880.
[414] I.e., once the effects of firm size, past performance, and investment in innovation are held constant.
[415] Cf. Markman et al. (2004), p. 539.

Bennett et al. (1998) investigate the association of several conceptually antecedent strategic, organizational, and environmental factors, with the extent that human resource management is integrated with strategic decision-making processes across a large sample of organizations, while also examining the relationship between human resource management integration with strategic decision making and performance-related indicators. Even though Bennett et al. are not directly assessing the impact of HR on performance (i.e., they argue HR integration into strategic decision-making processes, and the impact of those on performance), they are one of few authors to assess rareness by means of resources' factor market supply: they explore the effect of fixed HR supply according to the munificence degree of the labor market for specific HR. Also, their zero-order correlation matrix allows drawing conclusions on the relationship of HR on performance, although they are not being tested within the models.

In their paper, Bennett et al. derive the following hypotheses and operationalizations:

PROPOSITION 2 A: BENNETT ET AL. (1998)	
HYPOTHESES	***H1:*** Analyzers will have more integration between the HR function and strategic decision making than will either defenders of prospectors. ***H2:*** Firms operating in a munificent labor market will have less integration between the HR function and strategic decision making than firms in labor market characterized by scarcity. ***H3:*** Organizations' rate of change in size will be positively related to the level of integration between the HR function and strategic decision making. ***H4:*** The extent to which top managers view employees as strategic resources will be positively related to the level of integration between the HR function and strategic decision making. ***H5:*** The level of integration between the HR function and strategic decision making will be positively related to the performance of the HR function. ***H6:*** The level of integration between the HR function and strategic decision making will be positively related to organizational performance.
RESOURCES	***human resources:*** – ***value*** = employees as strategic resources; four items such as: management views its employees primarily as a cost of doing business (R); management views its employees as a key factor to our success – ***rareness*** = assessed through labor market munificence, several items reflect scarcity of resource, i.e., 'How would you assess the labor supply for this organization overall?'
PERFORMANCE	***temporary performance:*** – performance of the HR department = several items (e.g., to what extent do you feel your human resource department is performing its job the way you would like it to be performed?); – organizational performance = voluntary turnover rate, perceived profitability, sales per employee
MARKETS	***supply inelasticity:*** fixed supply expressed through labor market munificence for specific HR

Table 27: Example Proposition 2a – Bennett, Ketchen, and Schultz (1998)

The empirical results revealed that the integration of the HR function with strategic decision making is associated with strategic type and whether or not top management views employees as strategic resources. However, labor market munificence and organizational growth were

not. The correlation results were significant supportive of RBT (in connection with operational performance as dependent variable), as well as non-significant (in connection with firm-level performance). Regarding the relationship between integration and performance, integration was surprisingly associated with a lower evaluation of the HRM function by top management. In terms of organizational performance, results provided no significant relationship between integration and the performance measures.[416]

(4) Proposition 2b: Maijoor and Witteloostuijn (1996)

> ***Proposition 2b:*** *Firms that acquire or develop valuable and non-substitutable resources which are inelastic in supply can gain persistent economic rents by using them to develop and implement strategies.*

In the Dutch audit industry, Maijoor and Witteloostuijn (1996) assert that strategic regulation can be a major source of sustainable competitive advantage. The authors empirically assess that due to strategic regulation the demand for audit services were stimulated and rent-producing resources, i.e., RAs (register accountants), were protected. Due to strategic regulations, human resources (i.e., RA) were quasi-fixed and, hence, inelastic in supply, which in turn implied an increased scarcity as well as inimitability and non-substitutability. In their paper, Maijoor and Witteloostuijn derive the following hypotheses and operationalizations:

PROPOSITION 2 B: MAIJOOR AND WITTELOOSTUIJN (1996)	
HYPOTHESES	***H1:*** Following the implementation of the 1970 and 1983 changes in financial accounting regulation, (a) demand for audit services increased, (b) without an accompanying fall in the degree of concentration. ***H2:*** In response to the increase in the demand for audit services after the implementation of the 1970 and 1983 changes in financial accounting regulation, the ratio of RA employees plus independent RAs to RA partners increased. Since conclusive evidence cannot be obtained – due to lack of data – the following predictions are phrased as conjectures rather than hypotheses: ***Conjecture 1:*** After the implementation of the 1970 and 1983 regulations, RA partners were able to appropriate the associated rents. ***Conjecture 2:*** The audit market is (a) composed of two groups, a (relatively) attractive leading segment of large firms and a (relatively) unattractive follower niche of small firms, and (b) the composition of the leading segment is stable over time.

[416] Cf. Bennett et al. (1998).

PROPOSITION 2 B: MAIJOOR AND WITTELOOSTUIJN (1996)	
RESOURCES	***human resources (RA = register accountants):*** – ***value*** = number of annual accounts disclosed by public companies, private companies and cooperatives; and the number of professionals (NIvRA students and RA licensees) in audit practice; the authors predict that both the 1970 and 1983 financial accounting regulations have increased the forced demand for audit services, which would ceteris paribus increase the value and scarcity of the HR of RAs.; – ***rareness*** = degrees of concentration, i.e., Herfindahl-Hirschman indices; – ***inimitability*** = number of auditors according to the auditors status in the firm (employee, independent, practitioners, and partners); ratio of RA employees plus independent RAs to RA partners (the established professionals could limit entry into the partnerships of large audit firms; in that way the rent potential would be exploited by a group within the industry: large audit firms and their RA partners; so a mobility barrier is complemented with a promotion barrier which protects the rent-appropriating capacity of the owners of the firm); – ***substitutability*** = the law prohibits any substitution, since only RAs were allowed to provide audit services during the period of the study; law changes in financial accounting regulation (dummy variable)
PERFORMANCE	***persistent performance:*** – the top ranking of audit firms; – income of RA partners;
MARKETS	***supply inelasticity:*** Quasi-fixity of resources' supply due to strategic legal regulations in the Dutch audit industry. – implies rareness and value of resources as well as their inimitability and non-substitutability

Table 28: Example Proposition 2b – Maijoor and Witteloostuijn (1996)

Overall, results confirm the core predictions of RBT; large audit firms and their RA partners were able to appropriate the rent from the key resource in the audit market: human capital, i.e., RAs. Thus, strategic regulation can be seen as a major source of sustainable competitive advantage.[417]

(5) Proposition 3a: Example Brush and Artz (1999)

> ***Proposition 3a:*** *Firms that acquire or develop valuable resources under high information asymmetry can gain at least temporary economic rents by using them to develop and implement strategies.*

Regarding veterinary medicine, Brush and Artz (1999) examine the value of capabilities in dependence on information asymmetry within their contribution "Toward a contingent resource-based theory: the impact of information asymmetry on the value of capabilities in veterinary medicine". Brush and Artz assess the different medical activities' impact on firm performance differences, i.e., investigate the contingencies which define valuable resources in professional medical services. They identify different medical practice capabilities with credence, experience, and search qualities, depending on the information accessibility, and propose that different contingent combinations of capabilities are linked to performance

[417] Cf. Maijoor/Witteloostuijn (1996).

differences of veterinary practices. Since they could not measure these capabilities directly, the authors use client retention as an outcome of these capabilities.

In their paper, Brush and Artz derive the following hypotheses and operationalizations:

PROPOSITION 3 A: BRUSH AND ARTZ (1999)	
HYPOTHESES	***15 Hypotheses:*** The fifteen hypotheses focus on the symmetric/asymmetric information continuum between client and veterinarian regarding the credence, experience, and search characteristics of medical practice capabilities.
RESOURCES	***medical practice capabilities:*** – ***value*** = output of valuable practice capabilities in form of customer retention and the relationship to revenue/expense ratio, i.e., transaction (transactions per quarter, or client visit); new clients (number of new clients per quarter); repeat clients = transactions – new clients; repeat clients proportion = repeat clients/transactions; lab services/transactions = (expenses from outside lab fees and in-house lab supplies)/transactions; boarding services = 1 if the practice includes a facility for boarding animals, 0 otherwise
PERFORMANCE	***temporary performance:*** – revenue = total fees for services per quarter – expense = total expense for professional services per quarter
MARKETS	***information asymmetry:*** Other theories such as information asymmetry can be used to complement RBT to better understand the context of resources – this helps to develop the dimension of 'value' in the RBT framework. – information asymmetry = products have search, experience, and credence qualities; operationalized through different practice capabilities; – two different environments = one rather competitive due to large pet franchisers in 'Far West' and one relatively stable referred to as the 'other regions'; operationalized through dummy variable which is 1 if the practice is in the far west region, and 0 if it is in any other region (Northwest, Western, Middle West, Northeast, Southeast).

Table 29: Example Proposition 3a – Brush and Artz (1999)

Within their empirical study of 193 veterinary practices, Brush and Artz found evidence of performance benefits (i.e., practice profitability) of client retention. Here, the authors rather focus on the information asymmetry in the client-doctor relationship concerning the different practice capabilities offered, i.e., information asymmetry characteristics of the product market, instead of focusing on the information asymmetry on factor markets. However, the authors argue that veterinarian's practice capabilities with credence and experience qualities can act as isolating mechanisms towards new entrants, because the latter can not easily assess the specific value of these capabilities and imitate them since they involve complex resource-combinations as regards to client-doctor, staff-patient interactions.[418] Thus, information asymmetry in this connection affects both the client-doctor relationship as well as the competitors' attempts to enter the market. Brush and Artz conclude that "the value of resources is contingent on the context in which it is used; more specifically, in this case, the

[418] Cf. Brush/Artz (1999), p. 243.

importance of practice capabilities was found to be dependent on the type of service being offered and the implicit information asymmetry in the client-provider relationship."[419]

(6) Proposition 3b: Knott (2003)

> ***Proposition 3b:*** *Firms that acquire or develop valuable and rare resources under high information asymmetry can gain persistent economic rents by using them to develop and implement strategies.*

Regarding proposition 3b, Knott (2003) addresses a very interesting topic within her paper on "The Organizational Routines Factor Market Paradox". Knott argues that routines are generally seen to be inimitable due to their tacitness; yet, the existence of franchises poses a challenge to this assumption: "The mere communicability of a superior routine (necessary for transfer to franchisees) should cause the routine to lose value."[420] However, the empirical results proved routines to be indeed a valuable resource (total returns to franchised establishments were 50 % higher than those to independent establishments). Knott discovered that imitation barriers do exist, whereas they are not due to the resource's tacitness being controlled by franchisor or franchisee, but rather being self-imposed by the would-be imitators due to information asymmetries. As to the rareness of routines, Knott does not explicitly address and operationalize this resource condition; yet, she argues that these specific superior routines are only hold by specific franchisors and, therefore, can be considered rare.[421]

In her paper, Knott derives the following hypotheses and operationalizations:

PROPOSITION 3 B: KNOTT (2003)	
HYPOTHESES	***H1:*** Franchise routines are a valuable resource leading to differential performance of establishments. (This is decomposed into ***H1a***, that franchisees have higher performance than independents, and ***H1b***, that routines are a source of higher performance). ***H2:*** Isolating mechanisms are necessary to sustain the value of routines. Since the structure of franchising precludes routines from being tacit or causally ambiguous, the focus is on other isolating mechanisms. Decomposed into ***H2a***, that franchisees and independents have different knowledge of the routines, ***H2b***, that they have different interpretations about their value, and ***H2c***, that they face different incentives to use the routines.

[419] Brush/Artz (1999), p. 246.
[420] Knott (2003), p. 929.
[421] Cf. Knott (2003).

PROPOSITION 3 B: KNOTT (2003)	
INDEPENDENT VARIABLE	***organizational routines:*** – ***value*** = agreement on the value of 20 discrete practices; – ***inimitability*** = operationalized through information asymmetry; isolating mechanism variables address both the information sets, as well as incentives to execute routines; knowledge of each of the 20 practices and agreement that they are valuable; knowledge captures differences in independents' ability to obtain information not intended for release outside the franchise (external causal ambiguity); agreement captures differences in interpreting the obtained information
PERFORMANCE	***persistent performance:*** – total returns for 5 years (sum of net owner income plus royalties in a given year)
MARKETS	***information asymmetry:*** Less fidelity in the information received by independents for three reasons: – First, the franchisor may deliberately attempt to protect information about its routines from leaking outside the franchise boundary. – Second, independents may have different levels of competence in obtaining information not intended for it; operationalized through knowledge differences; – Third, independents may have differing abilities to interpret the information (i.e., discriminate valuable information from noise), once it has been received; operationalized through agreement differences.

Table 30: Example Proposition 3b – Knott (2003)

Thus, Knott demonstrates that routines within markets under high information asymmetries need to only be valuable (and rare) to gain persistent superior performance. The routine's inimitability results from the knowledge differences about this resource, i.e., the imitation barriers are not a property of the resource itself (i.e., tacitness and causal ambiguity), but rather a property of the management holding the resource (i.e., differences in information sets). Thus, information asymmetries will hinder the becoming of would-be imitators. And even though Knott does not assess non-substitutability, one can presume that, due to those information asymmetries, it will also be difficult for competitors to specify appropriate substitutes.

3.4 Preliminary Discussion and Conclusion on the Review

In this chapter I have attempted to take stock and provide a systematic assessment of empirical evidence on the operationalization of the three central constructs as well as the six central propositions within RBT. Furthermore, I wanted to provide guidelines for future research regarding the measurement of these constructs, i.e., of resources, performance, markets, and their conditions. To accomplish this I have analyzed 192 empirical articles published between 1984 and 2004.

First of all, the review of the empirical research shows that we have made substantial progress in the empirical part of the RBT. Especially, after Barney's article in 1991 a huge step

forward in this connection could be registered. Also, this section shows that in the early days of RBT researchers focused on the question whether firm or industry effects were more important for sustainable competitive advantage; after 1998 this shifted to the question, which resources and capabilities have an influence on firm performance.

Second, on the operationalization of the central constructs, the review revealed that:

- **(a)** special attention is paid to *intangible resources*, namely 72% of the empirical studies concentrated on these resources;
- **(b)** still 35% of resource-based empirical studies *fell short* on the operationalization of the central constructs' conditions, and rather concentrated on resources in general;
- **(c)** about 60% of the studies do not provide with an *adequate resource definition*, i.e., it is not distinguishable whether they refer to a unique resource or a resource-bundle;
- **(d)** the inimitability, rareness, and non-substitutability conditions were *under-represented*;
- **(e)** yet, multiple *operationalizations of resources* and their conditions *do* exist, and prove that an empirical parameterization of this construct is possible;
- **(f)** the review also revealed more than *50 different scales for tangible and intangible resources*, with reliability values being mostly above 0.7 (Cronbach's alpha);
- **(g)** *twenty-two items* could be identified which offer a good starting point for future RBT research regarding the operationalization and scale-development of resources' conditions;
- **(h)** the majority of the studies *did* concentrate on *rents* as the *dependent variable*;
- **(i)** there *are* several empirical operationalization measures for rents, whereas one of the better, more accurate measures is considered to be *Tobin's q*;
- **(j)** about 53% of the studies tried to capture the *sustainability* of performance;
- **(k)** while exploring a resource's impact on performance it is wise to survey different *aggregation-levels*, in order to detect and outline the overall net effect (i.e., *firm-level* and *lower-level performance*);
- **(l)** it is also important to acknowledge the construct's complexity in terms of possible *complications* such as *feedback-loops* and *retrospective bias* while using performance measures;
- **(m)** while operationalizing the performance construct, researchers should also try to *enlarge the construct space* (i.e., avoid single dimension operationalization approaches and rather operationalize several aspects of performance simultaneously) as well as *enhance*

the measurement quality (i.e., provide scope for assessing convergent validity by using both primary and secondary data);

(n) merely 55% of the studies acknowledged the importance of *context-based RBT studies* and operationalized or controlled market effects;

(o) there are several ways to operationalize the proposition-relevant market conditions of *information asymmetry* and *supply inelasticity*; and

(p) there are a few *exemplary context-based* studies which provide with *guidelines* on how to integrate context, i.e., accurately selecting the industry and defining boundaries, identifying strategic time periods, and comprehensively assessing a variety of industry and environmental variables.

Third, regarding the parameterization of the theory's central constructs, the indicators shown in Table 31 summarize the results from the review as discussed above. These indicators offer fruitful assistance for future RBT research.

CONSTRUCTS	PARAMETERIZATION APPROACHES
Rents	• parameterized preferably through ***Tobin's q***
Markets – inelastic supply	• ***fixed resources:*** environmental munificence as regards to the respective resources; • ***quasi-fixed resources:*** looking for resources which are non-transferable, non-tradable, or undergo significant value loss after trading because they are firm-internal intertwined, socially complex, or causal ambiguous; looking for specific industry regulations (e.g., law, governmental);
Markets – information asymmetry	• ***dynamism:*** measured through stability-instability by looking at turnover, absence of pattern, and unpredictability, i.e., the rate of environmental change and unpredictability of environmental change (e.g., focus is on discontinuities); measured through turbulence by looking at the degree of interconnection among environmental elements; • ***complexity:*** describes the heterogeneity and range of an organization's activities, whereas the greater the uncertainty the greater the information processing requirements, i.e., the increase in structural complexity of the environment will increase the need for strategic activities; looking for the number, diversity, and distribution of task-environment elements; • ***industry concentration:*** measured through market concentration; looking for number and size distribution of firms competing against each other in an industry, whereas the degree of environmental uncertainty is affected by the extent of realized or potential collusion that results from the number and size distribution of firms in the industry;
Valuable resources	• ***enhancing efficiency:*** absolute (within the firm) and relative (compared to competitors, industry, or the state without the use of this resource); looking for input/output ratios; • ***enhancing effectiveness:*** reduce costs, enhance quality; • ***market benefit:*** describing the market structure within which a firm operates, the kinds of strategies that are likely to be sources of superior performance, and the kinds of resources that enable firms to conceive of and implement these strategies;
Rare resources	• ***demand exceeds supply:*** looking for either fixed or quasi-fixed resources, their uniqueness, or their juristic liability; • ***counting:*** the simplest way would be to count the resources;

CONSTRUCTS	PARAMETERIZATION APPROACHES
Inimitable resources	• ***firm-specific development:*** developed over long periods of time; looking for either time compression advantages or path dependencies; • ***social complexity:*** linking numerous individuals and technologies; looking for the # of linkages and the resource's system dependence; • ***specificity:*** looking at the resource specificity (i.e., similar to system dependence, yet, focusing on the conjunction with other idiosyncratic, specific firm resources) or design specificity (i.e., if a resource is applied to serve a set of end user that is unique to the focal firm); • ***causal ambiguity:*** resources that are based on often taken-for-granted or non-detectable intangible relationships within a firm and its resources and between a firm and its stakeholders; looking for the observability, codifiability, and teachability of these resources and their relationships; • ***artificial mechanisms:*** legally protected from imitation; looking for possible legal protection mechanisms such as patents, licenses, etc.
Non-substitutable resources	• ***strategic equivalents:*** through comparison of output congruity, i.e., the lack of totally different resources which could realize the same output (same competitive advantage) confirm a resource's non-substitutability (e.g., # of alternative production processes); • ***substitutes:*** through restricted substitution due to the inimitability of a resource, i.e., if a resource is difficult to imitate, isolating substitutes becomes more difficult due to causal ambiguity; or restricted substitution due to legal regulations (e.g., # of imposed conditions for production such as certain political, social, or juristic restrictions as to what resources have to be used).

Table 31: Parameterizing RBT's Central Constructs

Finally, on the operationalization of the central propositions, the review provided several empirical examples. Here, the variety of applications makes it clear that, apparently, the comparability of these research results is very difficult. Thus, an integration of these results seems challenging. The next chapter will emphasize this problematic, trying to find a way to conclude on the empirical corroboration of RBT, i.e., on the overall statistical significance of the central propositions.

4 RBT: Vote Counting and Meta-Analysis

"As always, theory must survive rigorous empirical testing before we can speak of it as being well corroborated."

Godfrey and Hill (1995), p. 527.

Following Godfrey and Hill (1995), RBT must survive rigorous empirical testing before one could refer to it as a sufficiently supported theory.[422] After having analyzed the operationalizations of the theory's central constructs and propositions within the 192 empirical papers, the following chapter thus emphasizes the empirical corroboration of RBT in terms of its overall statistical significance regarding the empirical results. Accordingly, chapter 4 further attends to the second deficit identified within this dissertation: the lack of understanding towards the empirical validation of RBT is addressed by integrating the empirical results.

The methods for synthesizing and summarizing empirical results can be differentiated into narrative reviews, vote counting, as well as meta-analyses.[423] A narrative review verbally summarizes empirical results and is therefore not capable of evaluating quantitative results. In the case of heterogeneous results, the reviewer will rely on theoretical arguments to explain the differences. With a high number of primary studies this method tends not to be practicable, especially considering the heterogeneity of applied methods, operationalizations, and outcomes. To reduce this complexity reviewers tend to rely only on a fraction of the empirical studies, which is, of course, very subjective and questionable, since it does not fully exploit all the information available.[424] In addition, Light and Smith (1971) developed the so called vote counting method, distinguishing the results between significant positive, significant negative, and non-significant. To conclude on the "true" direction of the relationship, researchers often use the 33% rule, i.e., a positive (negative) effect is given if the relative frequency of the significant positive (negative) results exceeds 33%. Yet, such decision rules do not include differences between the empirical methods applied within the studies, as well as sample size differences and the actual strength of the effect values.[425]

The development of meta-analyses is a result of the criticism towards narrative reviews and vote counting methods. Glass (1976) was the first scholar to refer to the concept of meta-analysis. He asserts that "meta-analysis refers to the analysis of analyses. [It is used] to refer

[422] Cf. Godfrey/Hill (1995), p. 527.
[423] Cf. Fricke/Treinies (1985), p. 12ff.
[424] Cf. Hunter/Schmidt (1990), p. 468; Fricke/Treinies (1985), p. 12; Stamm/Schwab (1995), p. 7.
[425] Cf. Fricke/Treinies (1985), p. 66; Hedges/Olkin (1980), p. 367; Hunter/Schmidt (1990), p. 469ff.

to the statistical analysis results of a large collection of analysis results from individual studies for the purpose of integrating the findings."[426] Regarding RBT, synthesizing the existing evidence in this way can be an influential instrument in the building of knowledge, and can be as important as conducting new research. Meta-analyses allow empirical researchers to focus on recent empirical research; they systematically summarize empirical results while accounting for the variability of those results. Through integrating primary results one can enhance precision, reliability, validity, and the overall test effect size value. Furthermore, meta-analysis allows identifying research deficits as well as research mistakes within the primary research field.[427]

In this dissertation, I perform all three methods: (1) I conducted a comprehensive narrative review within chapter 3; (2) subsequently, I will complement those results through conducting vote counting as regards the six central propositions; as well as (3) integrating the primary results through a resource-based theory meta-analysis. Due to relying on all methods, both qualitative results regarding different operationalization approaches and quantitative results regarding the overall corroboration of RBT could be attained. Furthermore, by employing vote counting, it is possible to analyze small sub-sample sizes for specific resource-performance relationships which meta-analysis are not capable of because of minimum study and respective effect size requests.

4.1 Resource-based Theory Vote Counting

For a first overview of the hypothetical focus of the 192 studies, their hypotheses are going to be categorized according to the resource-conduct-performance-paradigm.

4.1.1 Focus of RBT Hypotheses

The categorization according to the ***resource-conduct-performance-paradigm*** produced five different categories: (1) *resource-performance* hypotheses; (2) *resource-conduc*t hypotheses; and (3) *resource-conduct-performance* hypotheses; as well as (4) *(resource-)conduct-performance* hypotheses, to account for studies which did not explicitly hypothesize resources to have an impact on performance, but where conduct is based on, respectively influenced by resources; and (5) *other resource-based-related* hypotheses, to comprise research which did not focus on the classical resource-conduct-performance paradigm, but nevertheless made a

[426] Glass (1976), p. 3.
[427] Cf. Schmidt (1992), p. 1174ff; Rustenbach (2003), p. 8f.

contribution regarding the development of RBT. Table 32 depicts the assignment of the 192 studies.

RBT Hypotheses	Total
Resource-Performance	**102**
Resource-Conduct	**36**
Resource-Conduct-Performance	**30**
(Resource-)Conduct-Performance	**12**
Other Resource-based-Related	**12**

Table 32: Focus of RBT Hypotheses

Table 32 shows that most of the studies focused on the question of resource impact on performance (53%) as the following examples illustrate. In analyzing organizational routines of franchises in the quick printing industry, Knott (2003) asserts that routines are indeed a valuable resource. The results show that total returns to franchised establishments were 50% higher than those to independent establishments.[428] Henderson and Cockburn (1994) provide support for the importance of competence as a source of advantage in research productivity, respectively R&D Performance.[429] Verified by executives based on a survey in the UK, Hall (1992) explores that intangible resources (i.e. patents, licenses, reputation, and employee know-how of operations) lead to a firm's sustainable competitive advantage.[430] DeCarolis and Deeds' (1999) results suggest that knowledge (stocks and flows) in the biotechnology industry may be the source of superior performance.[431]

Around 19% of the studies analyzed different resource-conduct relationships, such as the following examples: Schoenecker and Cooper's (1998) results show that specific resources in the computer industry could be associated with early entry, i.e., firms with higher technological, marketing, and financial resources will be first to enter industries with first mover opportunities.[432] Gulati (1999) explores the role of network resources and firm capabilities in determining alliance formation and shows that accumulated network resources arising from firm participation in the network of prior alliances are influential in firms' decisions to enter into new alliances.[433] Hitt et al. (2000) focus on the international strategic alliance partner selection and their differences in selection criteria between emerging and developed market firms. Results show that emergent market firms more strongly emphasized

[428] Cf. Knott (2003).
[429] Cf. Henderson/Cockburn (1994).
[430] Cf. Hall (1992).
[431] Cf. DeCarolis/Deeds (1999).
[432] Cf. Schoenecker/Cooper (1998). Their work is thus within the "…stream of research that considers how firm resources affect strategic decisions." Schoenecker/Cooper (1998), p. 1128.
[433] Cf. Gulati (1999).

partners' financial assets, technical capabilities, intangible assets, and willingness to share expertise, whereas developed market firms emphasized partners' unique competencies and market knowledge and access.[434]

The third category accounts for 16% of the studies, which concentrate on an entire resource-conduct-performance relationship. For example, Robins and Wiersema (1995) evaluate the influence of resources regarding portfolio interrelationships of multi-business firms and corporate financial performance. Their results show that a resource-based measure of portfolio relatedness in terms of shared strategic assets, such as know-how or capabilities, significantly accounts for the differences in performance of large diversified firms.[435] Daily et al. (2000) study the relationships between international CEO experience, tenure, firm internationalization, succession events, and firm performance. Their results showed that the international experience of CEOs interacts with the degree of internationalization as well as the CEO succession and significantly explained firm performance.[436] Markides and Williamson (1996) explore the determinants for enhancing performance through related diversification and revealed that related diversification enhances performance only when it allows a business to obtain preferential access to strategic assets that are rare, valuable, and highly inimitable.[437]

Just 6% of the studies explore (resource-)conduct-performance relationships, i.e., theses studies did not explicitly hypothesize resources to have an impact on conduct and, thus, on performance, but their research argues in terms that conduct is based on, respectively influenced by resources. For instance, Bergh (1995) tests the sustainable performance linkages with the decisions of business exits (i.e., selling of units by parent firms), controlling the influence of size and relatedness of units sold. The latter refers to the resource equipment of the focal unit, compared to the resource equipment of the parent firm.[438] Yet, Bergh does not explicitly hypothesize resources. Similarly, Mosakowski (1993) hypothesizes that "during the period when an entrepreneurial firm adopts a focus strategy (differentiation strategy), its performance will, on the average, be lower than the performance of other firms" as well as "after the entrepreneurial firm has put a focus strategy (differentiation strategy) in place, its performance will, on the average, be higher than the performance of other firms".[439] Here,

[434] Cf. Hitt et al. (2000).
[435] Cf. Robins/Wiersema (1995).
[436] Cf. Daily et al. (2000).
[437] Cf. Markides/Williamson (1996).
[438] Cf. Bergh (1995).
[439] Mosakowski (1993), p. 822.

Mosakowski implies that high costs are necessary for developing the unique or specialized resources involved, and the firm will generally outperform other firms later on because of the returns accruing to these resources. Thus, the author does not explicitly measure resources; however, implicitly implies the resource-based logic within his hypotheses.

Finally, a further 6% of the studies focus on 'other resource-based-related' hypotheses. For instance, Zander and Kogut (1995) explore the determinants for speed of transfer and imitation of capabilities, as well as the relation of the dimensions of the underlying knowledge. Results showed that imitation and transfer of manufacturing capabilities are affected by the ease of their codifying and communicating possibilities. Furthermore, the determinants of the time to imitation are found to be the extent to which knowledge of the manufacturing process is common among competitors and the degree of continuous recombination of capabilities leading to improvements of the product or the manufacturing process.[440] A further example for other resource-based related hypotheses is Helfat's (1997) study, which examined whether firms seek to alter their stock of knowledge in response to change in the external environment due to the firms' existing stocks of complementary know-how and other assets. Helfat found, that in response to rising oil prices, firms with larger amounts of complementary technological knowledge and physical assets also undertook larger amounts of R&D on coal conversion (a synthetic fuels process). By proving that the accumulation of dynamic capabilities enables firms to stay competitive through changing market conditions, Helfat rather aimed at proving a 'circumstance-resource' relationship in terms of changing market conditions than a 'resource-performance' relationship.[441]

4.1.2 RBT Vote Counting Results

The variety of these resource-conduct-performance relationships provided a broad overview of resource-based hypotheses and was especially helpful in presenting interesting operationalization examples within chapter 3. However, for the purpose of conducting a ***resource-based theory vote counting***, the following analyses will solely concentrate on the first and third category, i.e., the resource-(conduct-)performance hypotheses, for they represent the basis for the theory's core tenets. Therefore, I checked whether those 131 studies

[440] Cf. Zander/Kogut (1995).
[441] Cf. Helfat (1997).

provided the relevant statistical data as to the significance of the proposed relationships, which merely 86 studies did.[442] I coded those studies for the following information:

Resource Type:	▪ tangible, intangible, and resources in general
Resource Category and Sub Categories:	▪ *physical capital* (technology); ▪ *financial capital*; ▪ *routines* (static and dynamic); ▪ *intangible assets* (patents, networks, reputation, brand name, and culture) ▪ *capabilities* (technological, manufacturing, R&D, learning, organizational, marketing, and competitive capabilities); ▪ *human capital* (CEO&TMT, HRM practices, and HR skills and knowledge)
Resource Conditions:	▪ value, rareness, inimitability, and non-substitutability
Performance Level:	▪ firm-level performance vs. lower-level performance
Performance Category and Sub Categories:	▪ *accounting returns* (e.g., ROA, ROI) ▪ *stock market* (e.g., market to book value, Tobin's q, stock returns) ▪ *growth measures* (e.g., sales, profit, market share) ▪ *hybrids* ▪ *operational performance* (operations outcomes, service outcomes, human resource outcomes, infrastructure outcomes, technological development outcomes, and logistics outcomes)
Performance Conditions:	▪ temporary vs. persistent performance
Market Conditions:	▪ information asymmetry, supply inelasticity, and no market argumentations

Overall, I could identify 824 statistical tests of core RBT relationships, from which 491 (60%) were statistically supported, 301 (36%) produced statistically non-significant results, and 32 (4%) were statistically significant in the opposite direction to the theory.

In evaluating and interpreting these results, the high degree of heterogeneity within the data posed some difficulties. Therefore, the multiple and heterogeneous relationships between dependent and independent variables encompassed within this analysis will be revealed in a successive procedure: *First of all*, Table 33 and Table 34 will give a brief overview of the overall statistical significance for the different independent and dependent variables, i.e., resource-types, resource-categories, and resource-conditions, as well as performance-conditions and performance-levels. *Second*, Table 35 will summarize the corroboration attempts of the central propositions. *Third*, Table 36 to Table 41 will present additional

[442] For the vote counting, I relied on the results provided by the studies' models. Here, I coded whether the proposed relationships produced positive or negative significant as well as non-significant results.

detailed information on each of the central propositions, revealing separate results for different resource levels (i.e., resources in general, resource-types, resource-categories, as well as the three most tested resource-sub-categories and their performance impact). And *fourth*, Table 42 offers results of the measures used for the 10 main tested independent variables, i.e., HR skills and knowledge, management (CEO and TMT), HRM practices, technological capabilities, organizational capabilities, technology, manufacturing capabilities, reputation, R&D capabilities, and marketing capabilities.[443]

4.1.2.1 Results on the Independent Variables

Independent variables, as depicted in Table 7, were coded for different resource-types, different resource-categories as well as different resource conditions, i.e., if researchers operationalized each of the four conditions separately or as one single construct.

Intangible resources were the most frequently considered *resource-type*, appearing in 737 tests from which 62% were supported, 34% produced non-significant results, and merely 4% were significant in the direction opposite to RBT predictions. *Tangible resources* were the second most explored *resource-type*, analyzed in 70 tests from which 29% were supported, 63% produced non-significant results, and 8% represented results that run counter to RBT. The vast amount of non-significant results corresponds to resource-based logic since tangible resources tend to be more imitable and substitutable and, hence, not strategic. Finally, 8 studies sought to measure *resources in general* (17 tests), from which 59% supported RBT, 23% were non-significant, and 18% counter to RBT.

As for the different *resource-categories*, *capabilities* were the most frequently considered category with 335 tests from which 78% were supported, 19% non-significant, and 3% counter to RBT. Looking at the sub-categories of capabilities, technological capabilities were the most frequently considered independent variables (10 studies, 167 tests), followed by organizational capabilities (9 studies, 35 tests), R&D capabilities (7 studies, 22 tests), manufacturing capabilities (7 studies, 21 tests), marketing capabilities (6 studies, 12 tests), competitive capabilities (3 studies, 45 tests), and learning capabilities (3 studies, 11 tests). Except for organizational and R&D capabilities, all results tend to support the theory with more than 75%, producing negligible non-significant results and results counter to RBT. Regarding the former, organizational capabilities only offer 66% supporting tests and 9%

[443] Displaying all information for each individual resource would overwhelm the reader with to much information since there are over 27 different resource-sub-categories.

results that are opposite to RBT predictions, whereas R&D capabilities merely support the theory with 62% and produce 5% tests counter to the theory.

Resource-Types	# Studies	# Tests	# Supported	% Supported	# Counter	% Counter	# Not Significant	% Not Significant
Tangible	**12**	**70**	**21**	**29%**	**5**	**8%**	**44**	**63%**
Intangible	**80**	**737**	**460**	**62%**	**24**	**4%**	**253**	**34%**
Resources in General	**8**	**17**	**10**	**59%**	**3**	**18%**	**4**	**23%**
Resource-Categories*	**# Studies**	**# Tests**	**# Supported**	**% Supported**	**# Counter**	**% Counter**	**# Not Significant**	**% Not Significant**
Physical Capital**	**9**	**56**	**20**	**36%**	**1**	**2%**	**35**	**62%**
Technology	8	48	17	35%	1	2%	30	63%
Financial Capital	**4**	**13**	**1**	**8%**	**4**	**31%**	**8**	**61%**
Routines**	**9**	**70**	**29**	**42%**	**5**	**7%**	**36**	**51%**
Static Routines	3	10	6	60%	-	-	4	40%
Dynamic Routines	5	13	6	46%	1	8%	6	46%
Intangible Assets**	**18**	**62**	**34**	**55%**	**3**	**5%**	**25**	**40%**
Patents	3	7	3	43%	1	14%	3	43%
Networks	1	2	1	50%	-	-	1	50%
Reputation	7	18	12	67%	2	11%	4	22%
Brand Name	3	4	2	50%	-	-	2	50%
Culture	4	20	9	45%	-	-	11	55%
Capabilities**	**37**	**335**	**263**	**78%**	**10**	**3%**	**62**	**19%**
Technological Capabilities	10	167	143	86%	3	2%	21	12%
Competitive Capabilities	3	45	41	91%	1	2%	3	7%
Organizational Capabilities	9	35	23	66%	3	9%	9	25%
Manufacturing Capabilities	7	21	16	76%	2	10%	3	14%
R&D Capabilities	7	22	14	62%	1	5%	7	33%
Marketing Capabilities	6	12	9	75%	-	-	3	25%
Learning Capabilities	3	11	9	82%	-	-	2	18%
Human Capital**	**42**	**260**	**131**	**50%**	**3**	**1%**	**126**	**48%**
CEO and TMT	15	46	31	67%	2	4%	13	29%
HRM Practices	14	113	44	39%	-	-	69	61%
HR Skills & Knowledge	22	99	54	55%	1	1%	44	44%
Resource-Conditions	**# Studies**	**# Tests**	**# Supported**	**% Supported**	**# Counter**	**% Counter**	**# Not Significant**	**% Not Significant**
Value***	**85**	**810**	**476**	**59%**	**37**	**4%**	**297**	**37%**
Rareness	**2**	**3**	**2**	**67%**	-	-	**1**	**33%**
Inimitability	**4**	**7**	**6**	**86%**	-	-	**1**	**14%**
Non-Substitutability	**2**	**4**	**2**	**50%**	-	-	**2**	**50%**

* N = 796; i.e., excluding 17 tests with IV 'resources in general' and excluding 11 tests that did not further specify their tangible & intangible resources.
** Differences between the main categories and the sub-categories indicate the number of studies that did not further specify the main category.
*** Those studies are argumentatively encompassing (in part) rareness, inimitability, and/or non-substitutability.

Table 33: Independent Variables within Empirical Tests of RBT

Human capital resources were the second most explored *resource-category*, analyzed in 260 tests from which 50% were supported, 48% produced non-significant results, and 2% represented results that run counter to RBT. Looking at the sub-categories for further explanations on these findings, it seems though that managerial resources such as TMT and

CEO tend to support RBT, whereas HR skills and, even more, HRM practices still produce mixed findings. Especially the latter sub-category shows more than 61% non-significant results. These results are explicable through the various amounts of HRM practices that have been tested for strategic relevance and performance impacts, thus including many that obviously have no performance effect overall.

Routines were the third most explored *resource-category*, although the 70 tests were produced by only 9 studies.[444] Results show that there are more non-significant relationships (51%) compared to positive significant (42%) or counter significant (7%) findings. *Intangible assets* produced similar results, i.e., from the 62 tests within 18 studies 55% were supported, 5% counter and 40% non-significant. Regarding the sub-categories, reputation is clearly the most supported intangible asset with 67%. Interestingly, patents produce real mixed findings – 43% of the tests support RBT, whereas the same amount produces non-significant results while also 14% are in the opposite direction of the theory. For instance, Markman et al. (2004) explore the impact of patents in the pharmaceutical industry on performance, focusing on their inimitability and non-substitutability. Their results indicate that inimitability is significantly related to firm profitability and new product introductions, whereas non-substitutability is significantly related to new product introductions only once the effects of firm size, past performance, and investment in innovation are held constant.[445] DeCarolis and Deeds (1999), however, found significant results in the opposite direction of RBT predictions. The authors test the relationship between stocks (accumulated knowledge assets which are internal to the firm) and flows (knowledge streams into the firm) of organizational knowledge and firm performance in the biotechnology industry and operationalized stocks by the number of patents held by the firm.[446]

Finally, *physical capital* and *financial capital* represent the least explored *resource-categories*; the former accounts for 56 tests while the latter accounts for merely 13 tests. Both categories show about 60% non-significant findings, which analogously to the explanation above regarding tangible resources does not come as a surprise. Nonetheless, that financial capital also produced 31% significant results counter to RBT did come as a surprise. These results originate from a study by Harrison et al. (1991) which argues two contrary

[444] Compared to the fourth most explored resource-category of intangible assets, there are twice as many studies and yet just 62 tests.
[445] Cf. Markman et al. (2004).
[446] Cf. DeCarolis/Deeds (1999). Besides these results, the authors also found supportive significant relationships for stocks; those were operationalized using the number of products in development (total number of products in each of the significant stages of the pharmaceutical testing process) and citation data (the Science Citation Index according to the names of full-time top scientists employees).

propositions: that either differences or similarities in resource allocations between acquiring and target firms create value for merged firms in post-acquisition time periods. While the authors assert that differences in resource allocations will lead to higher post-acquisition performance due to obtaining complementarities, they stress that the notion of similarities in resource allocations is conform to RBT explanations, since those acquisitions would produce more significant synergies.[447] However, their findings do not support RBT in this context.

On the subject of *resource-conditions*, Table 7 clearly shows that the most frequented condition is *value* with 810 tests from which 59% supported RBT, 37% produced non-significant results and 4% were results counter to RBT.[448] As for the other three conditions, there were no results in the opposite direction to the theory, while 2 out of the 3 *rareness* tests, 6 out of the 7 *inimitability* tests, and 2 out of the 4 *non-substitutability* tests supported RBT. Examples for those tests have been sufficiently outlined within chapter 3.2.1.1.

Additionally, Figure 4 shows that most of the 824 tests were operationalized through constructs (53%), while proxies both produced more significant results (56%) as well as results in the opposite direction of RBT (69%).

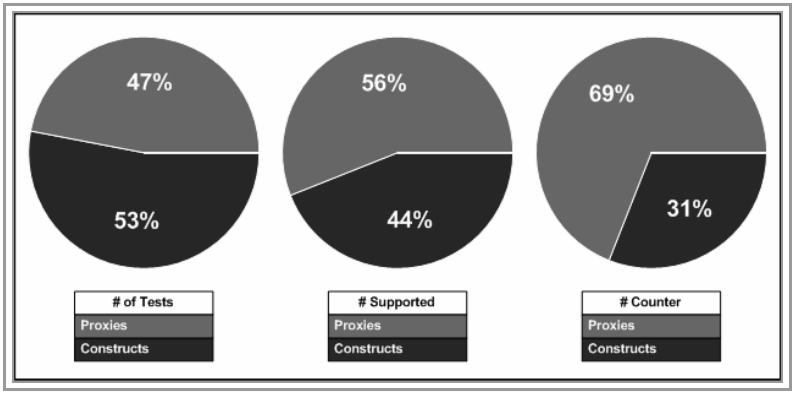


Figure 4: Proxies vs. Constructs

4.1.2.2 Results on the Dependent Variables

Next, with respect to ***dependent variables***, Table 34 depicts results for different performance-conditions and different performance-categories (i.e. levels).

[447] Cf. Harrison et al. (1991), p. 175.
[448] As discussed within chapter 3.2.1, some of those tests exploring value also argumentatively encompass one ore more of the other three resource conditions.

Performance-Condition	# Studies	# Tests	# Supported	% Supported	# Counter	% Counter	# Not Significant	% Not Significant
Temporary Performance	**49**	**506**	**288**	**57%**	**11**	**2%**	**207**	**41%**
Persistent Performance	**37**	**318**	**203**	**64%**	**21**	**6%**	**94**	**30%**
Performance-Category	**# Studies**	**# Tests**	**# Supported**	**% Supported**	**# Counter**	**% Counter**	**# Not Significant**	**% Not Significant**
Firm-Level Performance	**72**	**630**	**386**	**61%**	**29**	**5%**	**215**	**34%**
Accounting Returns	34	305	208	68%	22	7%	75	25%
Stock Market	9	51	36	71%	3	6%	12	23%
Growth Measures	11	57	33	58%	1	2%	23	40%
Hybrids	33	217	109	50%	3	1%	105	49%
Lower-Level Performance	**29**	**194**	**105**	**54%**	**3**	**2%**	**86**	**44%**
Operations	10	71	35	49%	1	2%	35	49%
Service	3	35	17	49%	-	-	18	51%
Human Resource	7	33	14	42%	-	-	19	58%
Infrastructure	1	3	2	67%	-	-	1	33%
Technological Development	6	20	14	70%	2	10%	4	20%
Logistics	2	32	23	72%	-	-	9	28%

Table 34: Dependent Variables within Empirical Tests of RBT

Temporary performance was the most frequently examined *performance-condition*, present in 506 statistical tests. Of these 57% were supported, while only 2% were counter to the theory. A higher level of support was found for predictions regarding *persistent performance*, i.e., 64% of the 318 tests supported the theory, whereas 6% were significant in the opposite direction.

Concerning the different *performance-categories*, the *firm-level performance* measures were the most frequented dependent variables. Here, 61% out of 630 tests were supportive of the theory, while only 5% were counter to the theory. Especially *accounting returns* (68%) and *stock market* (71%) produced positive significant results. As to *lower-level performance*, RBT explanations were less predictive – merely 54% out of 194 tests were significant in the direction predicted by the theory, while 44% produced non-significant results. Here, particularly *infrastructure outcomes* (67%), *technological development outcomes* (70%), as well as *logistic outcomes* (72%) were supportive of the theory. Again, examples of these tests have been sufficiently provided within chapter 3.2.2.1, especially Table 19.

4.1.2.3 Results on the Six Central Propositions

Next, Table 35 gives an overview of the ***results of the six central propositions***.[449] In addition to the structure of the previous tables, Table 35 also provides the results of the tests in percentages with respect to the sample size (N). This allows a comparison of the results of the mere tests with the relative sample size on which they are based.

Obviously, the most common test was on the effect of valuable and rare resources on temporary performance, i.e., 54% of the studies tested ***proposition 1a*** (447 tests). Here, 54% of the tests (57% of N) were statistically significant in the direction posited by RBT. However, 44% of the tests (39% of N) also showed no significant relationship in this regard. Second, 30% of the studies tested ***proposition 1b*** (245 tests), i.e., the relationship between valuable, rare, inimitable, and non-substitutable resources on persistent performance. They found more support for RBT with 71% of the tests (even 75% of N), while only 23% of the tests (22% of N) produced non-significant results.

[449] Given that only 19% of the studies operationalized resource conditions besides value, the present vote counting analysis and meta-analysis of the central RBT propositions also includes those studies that argumentatively assessed the rareness, inimitability, or non-substitutability of resources.

PROPOSITIONS	P1a	P1b	P2a	P2b	P3a	P3b	Total
# of Tests	447	245	10	8	49	65	824
% of Tests	54%	30%	1%	1%	6%	8%	100%
# of Studies	48	29	2	1	5	3	88
Sample Size (N)	75,356	147,982	886	200	30,381	18,838	273,643
Supported # of Tests	244	175	6	4	38	24	491
Supported % of Tests	54%	71%	60%	50%	78%	37%	60%
Supported % of N	57%	75%	44%	50%	86%	31%	68%
Counter # of Tests	8	14	-	-	3	7	32
Counter % of Tests	2%	6%	-	-	6%	11%	4%
Counter % of N	4%	2%	-	-	6%	12%	4%
Not Sign. # of Tests	195	56	4	4	8	34	301
Not Sign. % of Tests	44%	23%	40%	50%	16%	52%	36%
Not Sign. % of N	39%	22%	56%	50%	8%	57%	28%
*	Two studies – Hart & Banbury (1994) and Powell & Dent-Micallef (1997) – explored two different proposition types. Thus, the total # of studies adds up to 88 instead of 86.						

Table 35: Overview Central Propositions within Empirical Tests of RBT

Proposition 3b was the next most tested relationship, i.e., 8% of the studies were focusing on the effect of valuable and rare resources under high information asymmetry on persistent performance (65 tests). Here, however, only 37% of the tests (and even less considering 31% of N) showed a significant positive relationship in the direction of the theory, whereas 11% of the tests (12% of N) showed the opposite. ***Proposition 3a*** only came in fourth, with 6% of the studies testing the relationship between valuable resources under high information asymmetries on temporary performance (49 tests); nevertheless, this proposition was gaining the most support. Over 78% of the tests – and even 86% regarding the sample size – were supportive of RBT, while only 6% were in the opposite direction of the theory. Merely 1% concentrated on each of the ***propositions 2a*** (10 tests) and ***2b*** (8 tests), i.e., on the effects of resources under high supply inelasticity on – temporary vs. persistent – performance. Both produced rather mixed findings, i.e., equivalent percentages of support vs. non-significant results while no counter results were found within the studies' tests.

The following Table 36 to Table 41 offer additional details on the overall corroboration of the central propositions by depicting the results for the various resource-types, resource-categories as well as the three most tested resource-sub-categories.

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Valuable and Rare Resources	447 (100%)	48	**Firm-Level Performance**	**Accounting Returns**	91	**64**	70%	63%	**4**	5%	10%	**23**	25%	27%
				Stock Market	18	**8**	44%	57%	**1**	6%	2%	**9**	50%	41%
				Growth Measures	35	**22**	63%	63%	-	-	-	**13**	37%	37%
				Hybrids	168	**78**	46%	51%	**1**	1%	4%	**89**	53%	45%
			Lower-Level Performance	**Operational Performance**	135	**72**	53%	56%	**2**	1%	2%	**61**	45%	43%
Tangible Resources	18 (4%)	4	**Firm-Level Performance**	**Accounting Returns**	2	-	-	-	-	-	-	**2**	100%	100%
			Lower-Level Performance	**Operational Performance**	16	**4**	25%	23%	-	-	-	**12**	75%	77%
Intangible Resources	417 (93%)	46	**Firm-Level Performance**	**Accounting Returns**	85	**64**	75%	74%	**2**	3%	0%	**19**	22%	26%
				Stock Market	16	**7**	44%	53%	**1**	6%	2%	**8**	50%	45%
				Growth Measures	35	**22**	63%	63%	-	-	-	**13**	37%	37%
				Hybrids	167	**78**	47%	53%	-	-	-	**89**	53%	47%
			Lower-Level Performance	**Operational Performance**	114	**64**	56%	61%	**2**	2%	1%	**48**	42%	38%
Resources in General	12 (3%)	4	**Firm-Level Performance**	**Accounting Returns**	4	-	-	-	**2**	50%	74%	**2**	50%	26%
				Stock Market	2	**1**	50%	74%	-	-	-	**1**	50%	26%
				Hybrids	1	-	-	-	**1**	100%	100%	-	-	-
			Lower-Level Performance	**Operational Performance**	5	**4**	80%	28%	-	-	-	**1**	20%	72%
Physical Capital	13 (3%)	5	**Firm-Level Performance**	**Accounting Returns**	1	-	-	-	-	-	-	**1**	100%	100%
			Lower-Level Performance	**Operational Performance**	12	**4**	33%	32%	-	-	-	**8**	67%	68%
Financial Capital	6 (1%)	1	**Firm-Level Performance**	**Accounting Returns**	1	-	-	-	-	-	-	**1**	100%	100%
			Lower-Level Performance	**Operational Performance**	5	-	-	-	-	-	-	**5**	100%	100%

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Routines	43 (10%)	5	**Firm-Level Performance**	**Accounting Returns**	3	-	-	-	-	-	-	**3**	100%	100%
				Growth Measures	1	-	-	-	-	-	-	**1**	100%	100%
				Hybrids	20	**13**	65%	70%	-	-	-	**7**	35%	30%
			Lower-Level Performance	**Operational Performance**	19	**9**	47%	48%	-	-	-	**10**	53%	52%
Intangible Assets	33 (7%)	7	**Firm-Level Performance**	**Accounting Returns**	6	**6**	100%	100%	-	-	-	-	-	-
				Stock Market	3	**1**	33%	61%	**1**	33%	22%	**1**	33%	17%
				Growth Measures	2	**2**	100%	100%	-	-	-	-	-	-
				Hybrids	20	**8**	40%	54%	-	-	-	**12**	60%	46%
			Lower-Level Performance	**Operational Performance**	2	**2**	100%	100%	-	-	-	-	-	-
Capabilities	117 (26%)	17	**Firm-Level Performance**	**Accounting Returns**	45	**40**	89%	91%	-	-	-	**5**	11%	9%
				Stock Market	3	**1**	33%	33%	-	-	-	**2**	67%	67%
				Growth Measures	9	**9**	100%	100%	-	-	-	-	-	-
				Hybrids	32	**22**	69%	85%	-	-	-	**10**	31%	15%
			Lower-Level Performance	**Operational Performance**	28	**16**	57%	58%	**2**	7%	10%	**10**	36%	32%
Human Capital	222 (50%)	29	**Firm-Level Performance**	**Accounting Returns**	31	**18**	58%	59%	**2**	6%	1%	**11**	36%	40%
				Stock Market	10	**5**	50%	53%	-	-	-	**5**	50%	47%
				Growth Measures	23	**11**	48%	50%	-	-	-	**12**	52%	50%
				Hybrids	95	**35**	37%	40%	-	-	-	**60**	63%	60%
			Lower-Level Performance	**Operational Performance**	63	**37**	59%	62%	-	-	-	**26**	41%	38%

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Human Capital: HRM practices	113 (25%)	14	**Firm-Level Performance**	**Accounting Returns**	16	**9**	56%	52%	-	-	-	**7**	44%	48%
				Stock Market	4	**2**	50%	50%	-	-	-	**2**	50%	50%
				Growth Measures	4	**3**	75%	75%	-	-	-	**1**	25%	25%
				Hybrids	60	**19**	32%	40%	-	-	-	**41**	68%	60%
			Lower-Level Performance	**Operational Performance**	29	**11**	38%	40%	-	-	-	**18**	62%	60%
Human Capital: HR Skills and Knowledge	76 (17%)	12	**Firm-Level Performance**	**Accounting Returns**	5	**3**	60%	80%	-	-	-	**2**	40%	20%
				Stock Market	4	**2**	50%	42%	-	-	-	**2**	50%	58%
				Growth Measures	10	**2**	20%	16%	-	-	-	**8**	80%	84%
				Hybrids	30	**12**	40%	37%	-	-	-	**18**	60%	63%
			Lower-Level Performance	**Operational Performance**	27	**21**	78%	72%	-	-	-	**6**	22%	28%
Capabilities: Technological Capabilities	48 (11%)	6	**Firm-Level Performance**	**Accounting Returns**	32	**27**	84%	84%	-	-	-	**5**	16%	16%
				Hybrids	4	**4**	100%	100%	-	-	-	-	-	-
			Lower-Level Performance	**Operational Performance**	12	**5**	42%	41%	**2**	16%	20%	**5**	42%	39%

Note: Differences between the percentages of the resource-types and the resource-categories indicate the number of studies that did not further specify the main category, i.e., each percentage is in relation to the 100% of proposition 1a (N = 447).

Table 36: Vote-Counting Proposition 1a

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Valuable, Rare, Inimitable, and Non Substitutable Resources	245 (100%)	29	Firm-Level Performance	**Accounting Returns**	155	**120**	77%	69%	**10**	7%	19%	**25**	16%	12%
				Stock Market	6	**4**	67%	67%	**1**	17%	17%	**1**	16%	16%
				Growth Measures	3	**3**	100%	100%	-	-	-	-	-	-
				Hybrids	35	**24**	68%	68%	**2**	6%	0%	**9**	26%	32%
			Lower-Level Performance	**Operational Performance**	46	**24**	52%	59%	**1**	2%	0%	**21**	46%	41%
Tangible Resources	42 (17%)	7	Firm-Level Performance	**Accounting Returns**	15	**3**	20%	10%	**4**	27%	69%	**8**	53%	21%
				Hybrids	3	**2**	67%	38%	-	-	-	**1**	33%	62%
			Lower-Level Performance	**Operational Performance**	24	**8**	33%	33%	**1**	4%	4%	**15**	63%	63%
Intangible Resources	200 (82%)	25	Firm-Level Performance	**Accounting Returns**	138	**115**	83%	79%	**6**	5%	10%	**17**	12%	11%
				Stock Market	6	**4**	66%	66%	**1**	17%	17%	**1**	17%	17%
				Growth Measures	2	**2**	100%	100%	-	-	-	-	-	-
				Hybrids	32	**22**	69%	68%	**2**	6%	0%	**8**	25%	32%
			Lower-Level Performance	**Operational Performance**	22	**16**	73%	61%	-	-	-	**6**	27%	39%
Resources in General	3 (1%)	3	Firm-Level Performance	**Accounting Returns**	2	**2**	100%	100%	-	-	-	-	-	-
				Growth Measures	1	**1**	100%	100%	-	-	-	-	-	-
Physical Capital	35 (14%)	4	Firm-Level Performance	**Accounting Returns**	8	**3**	38%	38%	-	-	-	**5**	62%	62%
				Hybrids	3	**2**	67%	38%	-	-	-	**1**	33%	62%
			Lower-Level Performance	**Operational Performance**	24	**8**	33%	33%	**1**	4%	4%	**15**	63%	63%
Financial Capital	5 (2%)	2	Firm-Level Performance	**Accounting Returns**	5	-	-	-	**4**	80%	95%	**1**	20%	5%

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Routines	7 (3%)	3	**Firm-Level Performance**	**Accounting Returns**	1	**1**	100%	100%	-	-	-	-	-	-
				Stock Market	1	**1**	100%	100%	-	-	-	-	-	-
				Hybrids	4	**1**	25%	25%	**1**	25%	25%	**2**	50%	50%
			Lower-Level Performance	**Operational Performance**	1	**1**	100%	100%	-	-	-	-	-	-
Intangible Assets	18 (7%)	8	**Firm-Level Performance**	**Accounting Returns**	9	**3**	33%	46%	**2**	22%	17%	**4**	45%	37%
				Stock Market	1	-	-	-	-	-	-	**1**	100%	100%
				Growth Measures	1	**1**	100%	100%	-	-	-	-	-	-
				Hybrids	5	**4**	80%	96%	-	-	-	**1**	20%	4%
			Lower-Level Performance	**Operational Performance**	2	**2**	100%	100%	-	-	-	-	-	-
Capabilities	150 (61%)	13	**Firm-Level Performance**	**Accounting Returns**	119	**107**	90%	90%	-	-	-	**12**	10%	10%
				Stock Market	4	**3**	75%	75%	**1**	25%	25%	-	-	-
				Growth Measures	1	**1**	100%	100%	-	-	-	-	-	-
				Hybrids	13	**9**	69%	60%	**1**	8%	0%	**3**	23%	40%
			Lower-Level Performance	**Operational Performance**	13	**8**	62%	51%	-	-	-	**5**	38%	49%
Human Capital	17 (7%)	9	**Firm-Level Performance**	**Accounting Returns**	3	**2**	67%	84%	**1**	33%	16%	-	-	-
				Hybrids	8	**7**	88%	98%	-	-	-	**1**	12%	2%
			Lower-Level Performance	**Operational Performance**	6	**5**	83%	97%	-	-	-	**1**	17%	3%

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Capabilities: Technological Capabilities	119 (49%)	4	**Firm-Level Performance**	**Accounting Returns**	114	**103**	90%	90%	-	-	-	**11**	10%	10%
				Stock Market	2	**1**	50%	50%	**1**	50%	50%	-	-	-
				Growth Measures	1	**1**	100%	-	-	-	-	-	-	-
				Operational Performance	2	**2**	100%	-	-	-	-	-	-	-
			Lower-Level Performance											
Physical Capital: Technology	33 (14%)	4	**Firm-Level Performance**	**Accounting Returns**	8	**3**	37%	37%	-	-	-	**5**	63%	63%
				Hybrids	3	**2**	67%	38%	-	-	-	**1**	33%	62%
			Lower-Level Performance	**Operational Performance**	22	**8**	36%	36%	**1**	5%	5%	**13**	59%	59%
				Accounting Returns	1	**1**	100%	100%	-	-	-	-	-	-
Capabilities: R&D Capabilities	16 (7%)	4	**Firm-Level Performance**	**Stock Market**	1	**1**	100%	100%	-	-	-	-	-	-
				Hybrids	5	**4**	80%	88%	**1**	20%	12%	-	-	-
			Lower-Level Performance	**Operational Performance**	9	**5**	56%	50%	-	-	-	**4**	44%	50%

Note: Differences between the percentages of the resource-types and the resource-categories indicate the number of studies that did not further specify the main category, i.e., each percentage is in relation to the 100% of proposition 1b (N = 245).

Table 37: Vote-Counting Proposition 1b

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Valuable Resources (in supply inelastic markets)	10 (100%)	2	Firm-Level Performance	Accounting Returns	1	-	-	-	-	-	-	**1**	100%	100%
				Growth Measures	3	**2**	67%	67%	-	-	-	**1**	33%	33%
				Hybrids	4	**3**	75%	50%	-	-	-	**1**	25%	50%
			Lower-Level Performance	Operational Performance	2	**1**	50%	50%	-	-	-	**1**	50%	50%
Capabilities	2 (20%)	1	Firm-Level Performance	Growth Measures	1	**1**	100%	100%	-	-	-	-	-	-
				Hybrids	1	**1**	100%	100%	-	-	-	-	-	-
Human Capital	8 (80%)	2	Firm-Level Performance	Accounting Returns	1	-	-	-	-	-	-	**1**	100%	100%
				Growth Measures	2	**1**	50%	50%	-	-	-	**1**	50%	50%
				Hybrids	3	**2**	67%	40%	-	-	-	**1**	33%	60%
			Lower-Level Performance	Operational Performance	2	**1**	50%	50%	-	-	-	**1**	50%	50%

Table 38: Vote-Counting Proposition 2a

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Valuable and Non-substitutable Ressources (in supply inelastic markets)	8* (100%)	1	Firm-Level Performance	Accounting Returns	8	4	50%	50%	-	-	-	4	50%	50%

* All 8 tests are intangible resources, i.e., human capital.

Table 39: Vote-Counting Proposition 2b

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Valuable Resources (in markets with high information asymmetry)	49* (100%)	5	**Firm-Level Performance**	**Accounting Returns**	10	**8**	80%	64%	**2**	20%	36%	-	-	-
				Stock Market	27	**24**	89%	89%	**1**	4%	4%	**2**	7%	7%
				Hybrids	10	**4**	40%	40%	-	-	-	**6**	60%	60%
			Lower-Level Performance	**Operational Performance**	2	**2**	100%	100%	-	-	-	-	-	-
Competitive Capabilities	27 (55%)	1	**Firm-Level Performance**	**Stock Market**	27	**24**	89%	89%	**1**	4%	4%	**2**	7%	7%
Learning Capabilities	8 (16%)	1	**Firm-Level Performance**	**Accounting Returns**	6	**6**	100%	100%	-	-	-	-	-	-
				Hybrids	2	**1**	50%	50%	-	-	-	**1**	50%	50%
Manufacturing Capabilities	6 (12%)	1	**Firm-Level Performance**	**Accounting Returns**	4	**2**	50%	50%	**2**	50%	50%	-	-	-
			Lower-Level Performance	**Operational Performance**	2	**2**	100%	100%	-	-	-	-	-	-

* All 49 tests are intangible resources, i.e., capabilities. Differences between the percentages of the resource-examples and the overall 100% (N = 49) indicate the number of studies that did not further specify into different capabilities.

Table 40: Vote-Counting Proposition 3a

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Valuable and Rare Resources (in markets with high information asymmetry)	65 (100%)	3	**Firm-Level Performance**	**Accounting Returns**	40	**12**	30%	21%	**6**	15%	16%	**22**	55%	63%
				Growth Measures	16	**6**	38%	38%	**1**	6%	6%	**9**	56%	56%
			Lower-Level Performance	**Operational Performance**	9	**6**	67%	67%	-	-	-	**3**	33%	33%
Tangible Resources	10 (15%)	2	**Firm-Level Performance**	**Accounting Returns**	4	**2**	50%	50%	-	-	-	**2**	50%	50%
				Growth Measures	4	**1**	25%	25%	-	-	-	**3**	75%	75%
			Lower-Level Performance	**Operational Performance**	2	**1**	50%	50%	-	-	-	**1**	50%	50%
Intangible Resources	53 (82%)	3	**Firm-Level Performance**	**Accounting Returns**	36	**10**	28%	19%	**6**	17%	17%	**20**	55%	64%
				Growth Measures	12	**5**	42%	42%	**1**	6%	6%	**6**	50%	50%
			Lower-Level Performance	**Operational Performance**	5	**3**	60%	60%	-	-	-	**2**	40%	40%
Resources in General	2 (3%)	1	**Lower-Level Performance**	**Operational Performance**	2	**2**	100%	100%	-	-	-	-	-	-

IDV Measure Category	# of Tests	# of Studies	DV Measure Category	Data Type	Total # of Tests	Supported # of Tests	Supported % of Tests	Supported % of sample size	Counter # of Tests	Counter % of Tests	Counter % of sample size	Not Significant # of Tests	Not Significant % of Tests	Not Significant % of sample size
Physical Capital	8 (12%)	1	**Firm-Level Performance**	**Accounting Returns**	4	**2**	50%	50%	-	-	-	**2**	50%	50%
				Stock Market	4	**1**	25%	25%	-	-	-	**3**	75%	75%
Financial Capital	2 (3%)	1	**Lower-Level Performance**	**Operational Performance**	2	**1**	50%	50%	-	-	-	**1**	50%	50%
Routines	20 (31%)	1	**Firm-Level Performance**	**Accounting Returns**	20	**3**	15%	15%	**4**	20%	20%	**13**	65%	65%
Intangible Assets	11 (17%)	3	**Firm-Level Performance**	**Accounting Returns**	5	**2**	40%	22%	-	-	-	**3**	60%	78%
				Growth Measures	4	**2**	50%	50%	-	-	-	**2**	50%	50%
			Lower-Level Performance	**Operational Performance**	2	**1**	50%	50%	-	-	-	**1**	50%	50%
Capabilities	17 (26%)	2	**Firm-Level Performance**	**Accounting Returns**	8	**4**	50%	50%	**2**	25%	25%	**2**	25%	25%
				Growth Measures	8	**3**	37%	37%	**1**	13%	13%	**4**	50%	50%
			Lower-Level Performance	**Operational Performance**	1	-	-	-	-	-	-	**1**	100%	100%
Human Capital	5 (8%)	2	**Firm-Level Performance**	**Accounting Returns**	3	**1**	33%	33%	-	-	-	**2**	67%	67%
			Lower-Level Performance	**Operational Performance**	2	**2**	100%	100%	-	-	-	-	-	-

Note: Differences between the percentages of the resource-types and the resource-categories indicate the number of studies that did not further specify the main category, i.e., each percentage is in relation to the 100% of proposition 3b (N = 65).

Table 41: Vote-Counting Proposition 3b

In trying to integrate the main findings from Table 36 to Table 41, it seems suitable to compare the overall impact of different resource-categories on the different performance

measures. For instance, Figure 5 reveals that *tangible resources*, i.e., physical and financial capital, obviously have the most impact on *accounting return measures*, whereas *intangible resources* find more support using *hybrid measures* (usually indicating survey measures). Growth measures and stock returns produce rather negligible supportive results for both tangible and intangible resources; however, they have been applied less in general.

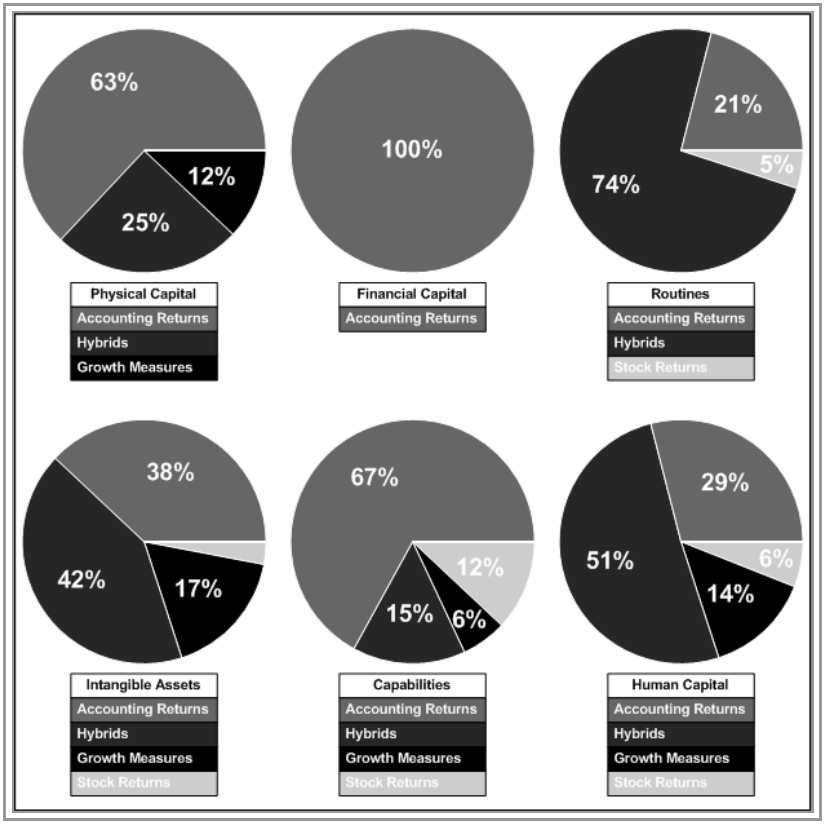


Figure 5: Impact of Resource-Categories on Firm Performance Measures (Supported)

Regarding lower-level performance measures, *physical capital* resources are especially supportive of RBT with respect to *operations outcomes* as depicted in Figure 6. Also, logistic outcomes and technological development outcomes offer significant positive results, whereas service outcomes only result in non-significant relationships.[450] *Financial capital* does indeed solely relate to *service outcomes*. It is, however, important to notice that these results are

[450] HR outcomes and infrastructure outcomes have not been applied within this resource-category.

based on two studies (i.e., Ray et al. (2004) and Kraatz and Zajac (2001)) of which 14% of their tests were supportive of RBT and the remaining 86% produced non-significant results.

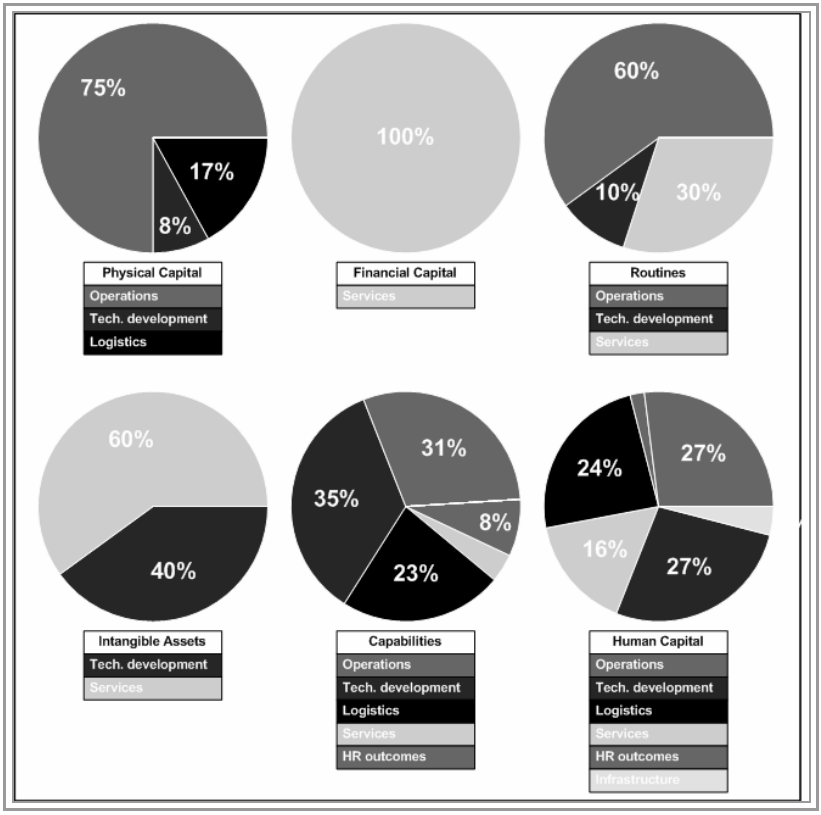


Figure 6: Impact of Resource-Categories on Lower-Level Performance Measures (Supported)

Regarding intangible resources, *routines* are also most supportive in relationship with *operations outcomes*, followed by service outcomes and technological development outcomes.[451] The most supportive relationships between *intangible assets* and lower-level performance were between *service outcomes* and *technological development outcomes*.[452] *Capabilities* have been tested with a larger variety of operational performance measures. The most frequented in support of the theory are *technological development outcomes* and

[451] Yet again, the tests regarding operations outcomes and service outcomes produced about 50% non-significant results as well.
[452] Other operational outcome measures have not been applied within this resource-category.

operations outcomes, followed by logistics, HR outcomes, and service outcomes.[453] Though, 14% of the tests between capabilities and technological development outcomes also cause results counter to RBT. Finally, *human capital resources* show significantly positive results for six different operational performance categories: almost equally supportive as regards to *operations*, *technological development*, and *logistic outcomes*, followed by services, infrastructure, and HR outcomes. The latter is, nevertheless, with 41% the most frequented category being explored within the human capital and operational performance relationship. Yet, over 60% of these tests result in non-significant effects.

4.1.2.4 Results on Different Resource Measure-Types

Additionally, Table 42 outlines more details on how consistently the theory was operationalized across studies by examining the various measures used for the 10 most common independent variables according to the number of studies: HR skills and knowledge, management (CEO and TMT), HRM practices, technological capabilities, organizational capabilities, technology, manufacturing capabilities, reputation, R&D capabilities, and marketing capabilities. Since HRM practices and manufacturing capabilities were only assessed through using constructs, Table 42 only shows the results for the remaining 8 resources' measures.

[453] Logistics and service outcomes, however, produced again about the same percentage of non-significant results as significantly supportive results. Infrastructure outcomes have been used as the dependent variable as well, yet, did only result in non-significant relationships.

INDEPENDENT VARIABLE	# Studies	# Tests	# Support	% Support	# Counter	% Counter
HR Skills and Knowledge						
# of years experience	**2**	**3**	**3**	**100%**	**-**	**-**
# of employees	**1**	**4**	**4**	**100%**	**-**	**-**
# of turnover	**1**	**1**	**1**	**100%**	**-**	**-**
# of citing employees publications	**1**	**1**	**1**	**100%**	**-**	**-**
leverage (employees/management)	**3**	**4**	**3**	**75%**	**-**	**-**
salary	**1**	**1**	**1**	**100%**	**-**	**-**
coefficient of location favorableness	**1**	**1**	**1**	**100%**	**-**	**-**
industry skill level (highly skilled jobs / total employment)	**1**	**1**	**-**	**-**	**1**	**100%**
CEO and TMT						
# of years experience	**4**	**10**	**6**	**67%**	**-**	**-**
# of years in the firm (tenure)	**2**	**4**	**3**	**75%**	**-**	**-**
# of years education	**1**	**1**	**1**	**100%**	**-**	**-**
Technological Capabilities						
relative R&D expenditures to sales	**2**	**5**	**3**	**60%**	**-**	**-**
patent citing ratios	**1**	**4**	**3**	**75%**	**1**	**25%**
total R&D expenditures	**1**	**1**	**1**	**100%**	**-**	**-**
IT expert ratings	**2**	**144**	**128**	**89%**	**-**	**-**
Organizational Capabilities						
# of awards	**1**	**8**	**4**	**50%**	**-**	**-**
average production expenditures	**1**	**8**	**3**	**38%**	**3**	**38%**
# of years experience	**1**	**2**	**2**	**100%**	**-**	**-**
Technology						
relative R&D expenditures to sales	**2**	**6**	**4**	**67%**	**-**	**-**
% of pollution released	**1**	**4**	**2**	**50%**	**-**	**-**
% of pollution reduction	**1**	**4**	**1**	**25%**	**-**	**-**
Reputation						
# of awards	**1**	**1**	**1**	**100%**	**-**	**-**
media favorableness coefficient	**1**	**1**	**1**	**100%**	**-**	**-**
# of complaints	**1**	**4**	**-**	**-**	**2**	**50%**
# of applicants	**1**	**1**	**1**	**100%**	**-**	**-**
# of rejected applicants	**1**	**1**	**-**	**-**	**-**	**-**
R&D Capabilities						
# of publications	**1**	**2**	**2**	**100%**	**-**	**-**
resource allocation responsibility	**1**	**2**	**2**	**100%**	**-**	**-**
# of cross-functional teams	**1**	**2**	**-**	**-**	**-**	**-**
# of geographically dispersed research units	**1**	**2**	**-**	**-**	**-**	**-**
relative R&D expenditures to sales	**1**	**2**	**2**	**100%**	**-**	**-**
average percentage of R&D exp.	**1**	**1**	**-**	**-**	**-**	**-**
total R&D expenditures	**1**	**2**	**2**	**100%**	**-**	**-**
# of drug approvals	**2**	**3**	**2**	**67%**	**1**	**33%**
Marketing Capabilities						
relative marketing exp. to sales	**3**	**5**	**2**	**40%**	**-**	**-**
infrequency of purchase	**1**	**1**	**1**	**100%**	**-**	**-**

Table 42: Overview Measures (Proxies) of Main Independent Variables

As depicted in Table 42, the most common measures used for measuring the value of human capital resources were the *number of years of experience* or the *number of years an employee*

(or manager) has spent in the firm (i.e., tenure). Most of those tests produce significant results in support of the theory, whereas about 25% produced non-significant results.

The most common measure for assessing the value of different types of capabilities referred to *expenditures*, e.g., marketing expenditures, average production expenditures, or R&D expenditures. Regarding the latter, evidently, this measure has been used for different resource-categories. For instance, *relative R&D expenditures* have been widely applied to assess technological capabilities (e.g., the studies of Delios and Beamish (1999) and Dhanaraj and Beamish (2003)), technology (e.g., the studies of Yeoh and Roth (1999) and Dhanaraj and Beamish (2003)), and R&D capabilities (e.g., as a control variable within the study of DeCarolis (2003)).[454] Similarly, the *number of drug approvals* has been used to measure different kinds of resources: *R&D capabilities*, which Yeoh and Roth (1999) also term component capabilities and DeCarolis and Deeds (1999) use to assess a firm's stock, *integrative capabilities* defined by Yeoh and Roth (1999) as the ability of a firm to use resources and component capabilities to support organizational renewal. This can be understood as the success of a drug approval routine, as well as *regulatory capabilities* used by DeCarolis (2003), which again resembles an organizational routine of effectively dealing with the FDA (Food and Drug Administration).[455]

4.1.3 Discussion on the Vote Counting Results

First of all, the results of the propositions indicate an overall positive significant impact of resources on performance of 60% for all tests and even 68% regarding the sample size weighted results. Merely 4% of the results were in the opposite direction of the theory. Accordingly, the integration of quantitative research findings on resource-based studies via vote counting revealed an overall positive empirical corroboration of RBT.

Second, factor market conditions have evidently not found their way into many empirical tests. Very few discuss and explore the impact of factor market conditions on resources and, respectively, on performance. At the most, researchers discuss effects of environmental uncertainty, yet, hardly refer to its influence on resources' value, rareness, inimitability, and non-substitutability. Thorough context investigations are scarce, as are in-depth analysis of the four resource conditions. Empirical RBT research still seems to focus on identifying a firm's valuable resources and provide evidence for their impact on performance increase, whereas almost no empirical attention is being paid to their rareness, inimitability, and non-

[454] Cf. Delios/Beamish (1999); Dhanaraj/Beamish (2003); Yeoh/Roth (1999); DeCarolis (2003).
[455] Cf. DeCarolis/Deeds (1999); Yeoh/Roth (1999); DeCarolis (2003).

substitutability, as well as to their factor market conditions. Thus, the central constructs' basic conditions seem to be neglected, for the most part. But without these resource specifications, we can not explicitly speak of a strategic resource in terms of resource-based logic, and without context specifications, we can not derive distinct implications for management practice.

Third, the results of the RBT vote counting revealed that intangible resources clearly outperformed tangible resources, whereas capabilities showed the most support, followed by intangible assets (especially reputation) and human resources (especially management and CEO). Regarding the dependent variables, firm-level performance measures (especially stock market and accounting returns) received slightly more support than lower-level performance measures. Striking, however, were the enormous amounts of non-significant results within each of the independent and dependent variable categories. Considering the studies' research focus, researchers strived to prove the strategic value of specific resources for the firm. With non-significant results, the resources' strategic value could not be affirmed and researchers would simply conclude that those specific resources were not valuable for this specific firm (or industry).[456] Only if results were significantly counter to RBT, would researchers have to explain an anomaly, i.e., a phenomenon the theory could not account for.[457] Obviously, RBT leaves little room for such results since firms' non-strategic resources rather tend to have no impact on firm performance than a negative impact. Accordingly, the huge amount of non-significant results does seem reasonable, yet hints at the problem of predetermining the *actual* strategic resources of firms.

Fourth, Figure 4 shows that most of the tests used construct-operationalizations instead of relying on proxies. In general, this is seen to be the better choice since surveys tend to get closer to the core of strategic resources than proxies. And even though the percentage of supported tests based on constructs is slightly lower than of those using proxies, the proportion of tests counter to RBT is more than twice as high for proxies compared to constructs. Whereas these tests can of course be interpreted as results counter to RBT, they might also hint at a misapplication of the respective proxies. The mixed findings towards the utilization of measures (see Table 42) add to this argumentation. Moreover, they emphasize again the adherent necessity of properly defining the resources under investigation and

[456] Hoopes et al. (2003) acknowledge this problem, pointing out that "…disconfirming the RBT is difficult. The theory is supported by any evidence that interfirm variation in resources and capabilities creates sustainable performance differences. Yet, evidence to the contrary indicates only that the resources or capabilities examined lack value." Hoopes et al. (2003), p. 891.

[457] E.g., Knott (2003); DeCarolis/Deeds (1999); McEvily/Chakravarthy (2002); Miller/Shamsie (1996).

agreeing upon generally accepted categorizations and definitions. Otherwise, integrating the results and gaining information becomes rather difficult, up to the point of becoming senseless, if one uses the same proxy for measuring totally different resources.

Finally, in view of the subsequent meta-analysis, the vote counting results allude to possible moderators for the resource-performance relationship, such as resource categories, resource sub-categories, performance measure types, or different data types (proxy vs. construct). Accordingly, within the next chapter, I will further integrate these findings with regard to their overall statistical significance by conducting a resource-based theory meta-analysis with the respective moderators.

4.2 Resource-based Theory Meta-Analysis

As outlined at the beginning of this chapter, meta-analysis is the most powerful method for synthesizing empirical results.[458] Through systematically summarizing and integrating primary empirical results while accounting for the variability of those results, one can enhance precision, reliability, validity, and the overall test effect size value. Furthermore, meta-analysis allows identifying research deficits as well as research mistakes within the primary research field.[459]

Depending on the statistical method, the meta-analyses' literature distinguishes between descriptive and interference-statistical meta-analyses. The former assesses a mean effect size (e.g., a mean correlation coefficient) and offers the possibility for bias corrections.[460] To assure the overall effect, interference-statistical methods calculate a probability value using the primary studies' probability values or tests statistics.[461] Analogously to most of the meta-analyses conducted within business economics, I chose to rely on a descriptive meta-analysis according to Hunter and Schmidt (2004). In the next section, I will briefly outline the process of conducting meta-analyses, following Cooper's (1982) five step process.[462]

[458] Cf. Fricke/Treinies (1985), p. 12ff. Glass, who was the first scholar to refer to the concept of meta-analysis, asserts that "meta-analysis refers to the analysis of analyses. I use it to refer to the statistical analysis results of a large collection of analysis results from individual studies for the purpose of integrating the findings." Glass (1976), p. 3.
[459] Cf. Barrilleaux-Pizzolatto/Chhokar (1985), p. 15; Eden (2002), p. 841; Schmidt (1992), p. 1174ff; Rustenbach (2003), p. 8f; Lam/Kennedy (2005), p. 168.
[460] Cf. Fricke/Treinies (1985), p. 18ff; Hedges/Olkin (1992); Hunter et al. (1982); Hunter/Schmidt (1990). For further details on different descriptive meta-analyses methods see Hunter/Schmidt (1990), p. 478ff.
[461] Cf. Rosenthal (1991).
[462] Cf. Cooper (1982).

4.2.1 Process of Meta-Analyses

While conducting meta-analyses, Cooper (1982) suggests processing the following five steps: (1) outlining the research question, (2) systematical assessment of primary studies, (3) coding of primary studies, (4) integration of the primary-study-results, and (5) presenting and interpreting the results. I will follow these steps and, in addition, also look at the advantages and the main criticism of meta-analyses.[463]

4.2.1.1 Outlining the research question

Similar to primary research, secondary research starts with the central research question, which will guide the studies' selection, coding, and analysis, as well as determine the dependent and independent variables. Researchers should not rely on too many details within their question in order to not exclude possible moderators upfront.[464] Furthermore, the relationship has to be quantifiable since meta-analyses are statistical procedures. The main goal of meta-analyses is to estimate the strength of the relationship between two variables of interest, while identifying the influence of any moderators of this relationship. Effect sizes produced by primary studies, such as correlation coefficients, are the unit of analysis within meta-analyses; they can be statistically corrected for experimental artifacts (e.g., sampling error, error of measurement, etc.), whereas the corrected mean effect size can be interpreted as an estimate of the population mean effect size.[465] Through evaluating the variance in the effect sizes (also statistically corrected for experimental artifacts), one can then determine whether there are any moderators for this relationship.[466]

The overall *research question of this dissertation* is to analyze, qualify, and quantify the impact of strategic resources on performance. While focusing on the six central RBT propositions, the vote counting results revealed that only four out of these six offer enough studies and potential tests to further continue with meta-analyses. Since assessing the overall statistical significance through meta-analyses requires researchers to include more than three studies, only proposition 1a, 1b, 3a, and 3b can be further employed. Otherwise, meta-analyses results are not considered reliable.[467]

In anticipation of one of the main criticism of meta-analysis, i.e., mixing "apples with oranges", it is important to carefully define the constructs within these propositions as well as

[463] Cf. Cooper (1982), p. 291ff; and similar Stamm/Schwarb (1995), p. 13ff.
[464] Cf. Lipsey/Wilson (2001), p. 12.
[465] Cf. Cohen (1977), p. 9f; Breaugh (2003), p. 80.
[466] Cf. Whitener (1990), p. 315; Stamm/Schwab (1995), p. 12.
[467] Cf. Rasmussen/Loher (1988), p. 685.

exemplify representative measures.[468] Both have been sufficiently outlined within chapter 2.3.3 and 3.2; however, it is necessary to acknowledge one additional limiting aspect for the present meta-analysis: the studies' measures have to capture and aim at the same correlation. The central propositions emphasize that firms which *'acquire or develop strategic resources and use them to develop and implement strategies'* will gain economic rents, indicating that a firm owns these resources as well as employs them. In reference to the results from the narrative review, as well as the results through vote counting, the majority of the researchers apparently assess the proposed relationships within the central propositions by focusing on whether a firm *owns* those resources. Thereby, their operationalization measures either capture a *more* of resources or a *better quality* of resources. A "more" of strategic resources equals a "more" of performance for the firm; these are measures that encompass the number of resources as well as the expenditures and investments in those resources. Resources of "better quality" also lead to comparably "better" performance for the firm; these are measures that actually try to capture the value of resources (e.g., quality enhancing or cost reducing aspects). Table 43 exemplifies some measures in this respect:[469]

A "more" of resources	A "better quality" of resources
# of contracts; # of awards; # of buildings owned; # of years experience; # of years in the firm; # of publications; # of patents; # of hours invested in the process; expenditures (relative or absolute); items assessing the # of alliances (experience)	ratings; coefficient of media favorableness; coefficient of location favorableness; items assessing the strategic conditions of resources

Table 43: Representative Measures

Accordingly, only those studies with corresponding measures will be included.

As for possible *moderators*, I apply those identified through vote counting and analyze (1) *theory-related moderators*, i.e., the remaining four propositions, (2) *model-related moderators*, i.e., resource-categories, resource-sub-categories, as well as performance-levels and performance measure-types (where possible), as well as (3) *explorative moderators*, e.g., data source, data-type, publication source, year of publication, multiple vs. single industry, and research area.

[468] See chapter 4.2.3 for more details on the problem of "apples and oranges".
[469] Constructs have been assessed whether their items focused on one of the category.

4.2.1.2 Systematical assessment of primary studies

The detailed description of the systematical assessment of primary studies has already been provided in chapter 3.1. In general, meta-analysts should predefine criteria for including primary studies in order to provide a systematical and comprehensible assessment. Lipsey and Wilson (2001) offer seven different categories that help to establish so-called eligibility criteria (examples for the present analysis are put in parentheses):[470]

- *distinguishing features* (e.g., quantifiable impact of resources on performance),
- *research respondents* (no restriction),
- *key variables* (resources, performance, markets),
- *research designs* (surveys, case studies),
- *cultural and linguistic range* (English),
- *time frame* (1984-2004), and
- *publication type* (journals).

As described above within the vote counting section, merely 86 out of 192 empirical RBT studies provided the relevant data and statistics. Here, even fewer studies can be employed due to focusing on just four propositions and the fact that effect sizes were not attainable for all of the studies, since not all provided correlations or the relevant descriptive statistics.[471] The present analysis thus comprises 240 tests from 59 studies.

4.2.1.3 Coding of primary studies

Coding the primary studies for meta-analysis is similar to conducting survey research: instead of a questionnaire researchers have to prepare a coding report which will then be filled out by the coder through "interviewing" the studies.[472] Such a coding report includes, for instance, information on the studies' research design, sample size, sampling descriptions, measurement, analyses, findings, direction and magnitude of findings (effect sizes), and descriptive statistics.[473] Obviously, the coding process for a meta-analysis can be very complex and time-consuming, especially if the studies differ on many dimensions.[474]

Researchers' main goal is to determine one type of effect size that defines the relationship between the dependent and independent variable.[475] Generally, standardized mean differences

[470] Cf. Lipsey/Wilson (2001), p. 16.
[471] See chapter 4.2.1.3 for more details.
[472] Cf. Lipsey/Wilson (2001), p. 73.
[473] Cf. Hunter/Schmidt (2004), p. 472.
[474] Cf. Hunter/Schmidt (2004), p. 470.
[475] Cf. Fern/Monroe (1996), p. 90; Breaugh (2003), p. 80ff.

and correlation coefficients are used within meta-analyses.[476] Whereas the former are suitable for comparing differences between two groups, the latter concentrate on the linear relationship between two variables. However, different effect sizes are convertible among each other.[477] Most of the primary studies focus on the relationship between resources and performance, instead of comparing performance differences of firms with strategic resources and firms without such resources. Thus, the following descriptions concentrate on meta-analyses using correlation coefficients. Often, effect sizes are not directly attainable due to missing statistics. Through using test statistics, researchers can reconstruct effect sizes in such cases, applying the following formula:[478] ***Significance Test = Effect Size * Sample Size***.

So, while coding the studies, besides effect sizes, one also has to extract the relevant statistics whenever effect sizes are not directly attainable.[479] Some studies, however, do not even provide relevant statistics. For instance, authors report a non-significant effect, yet do not outline any quantitative information such as a t-value, means, or standard deviations. For those occurrences Lipsey and Wilson (2001) suggest imputing a value such as zero for the missing effect sizes, which I did within the present study.[480]

Another problem occurs regarding the use of multivariate relationships: although regression coefficients are standardized, the varying sets of independent variables across regression equations complicate their synthesis. Even though some authors, such as Lipsey and Wilson (2001), as well as Peterson and Brown (2005), suggest different approaches for including standardized regression coefficients, they are not widely accepted and most of the meta-analysts still decide not to make use of these studies.[481] Thus, for the present meta-analysis, I decided to exclude those studies where only standardized regression coefficients and no separate effect sizes were attainable. The same argument applies to canonical correlation coefficients: following Hunter and Schmidt (2004), such correlations cannot be cumulated

[476] Cf. Lipsey/Wilson (2001), p. 37ff. For a review on the history of effect sizes, see Huberty (2002).
[477] See Rosnow et al. (2000), p. 446ff and Fern/Monroe (1996), p. 94 for more details.
[478] Cf. Rosenthal (1991), p. 14f; Rosenthal/DiMatteo (2001), p. 72.
[479] See Lipsey/Wilson (2001), p. 189ff and Rosenthal/DiMatteo (2001), p. 72 for more details on formulas for calculating effect sizes from a range of statistical data.
[480] Cf. Lipsey/Wilson (2001), p. 70.
[481] Lipsey and Wilson (2001), for instance, suggest two different approaches: (1) conduct a combined significance test analysis to determine of whether the aggregate data showed a significant effect (rejection of the null hypothesis); or (2) conduct a 'limited' analysis of the standardized regression coefficients, calculating the median regression coefficient for each independent variable of interest. Cf. Lipsey/Wilson (2001), p. 67f. Peterson and Brown (2005) conduct a meta-analysis using standardized regression coefficients, i.e., more than 1,700 corresponding beta coefficients and correlation coefficients from published studies. Their results indicate that under certain conditions, using knowledge of corresponding beta coefficients to impute missing correlations (effect sizes) generally produces relatively accurate and precise population effect-size estimates. Based on the relationship between beta and r, the authors imputed corresponding correlation coefficients when only beta coefficients were reported. Cf. Peterson/Brown (2005), p. 175ff.

across studies since they depend, similar to regression correlations, on an exact set of predictors as well as on an exact set of dependent variables.[482]

There are some empirical studies that use several operationalizations for one construct, i.e., several operationalizations for the independent and dependent variables, which result in multiple correlation coefficients for the same context (conceptual replication). These correlations are not statistically independent. Here, researchers should solely rely on one standardized effect size for each study.[483] Afterwards, in the context of the moderator analysis, one can then conduct separate meta-analyses for each operationalization in order to test for possible effects.[484] If studies use separate sub-groups with statistically independent effect sizes, they can all be included within the meta-analysis.[485] Therefore, I evaluated standardized effect sizes for (a) dependent variables within the same measure-type category,[486] (b) independent variables within the same resource-(sub-)category, (c) independent variables assessing the same resource, however, different resource-conditions, and (d) for multiple-year data using the weighted averages of the dependent correlations contributed by the studies.[487]

Additionally, besides effect sizes, test statistics, sample sizes, and operationalizations, meta-analysts also have to record methodological and content-related differences between studies for possible moderators in this respect.[488] So, in addition to the statistical data and the data that were assessed for the vote counting procedure, I also coded the following information:[489]

Methodological Differences:
- data source
- data type
- publication source
- year of publication

Content-related Differences:
- single vs. multiple industries
- research area

4.2.1.4 Integration of the primary study results

The fundamental idea behind integrating the primary study results is to conclude on a standardized *effect size* for all studies, while acknowledging their statistical significance. A

[482] Cf. Hunter/Schmidt (2004), p. 476f.
[483] Cf. Cheung/Chan (2004), p. 780; Barrilleaux-Pizzolatto/Chhokar (1985), p. 17. For further discussions on the degree of interdependence and possible solutions in this respect, see Cheung/Chan (2004).
[484] Cf. Hunter/Schmidt (1990), p. 451ff.
[485] Cf. Hunter/Schmidt (1990), p. 463ff.
[486] Regarding multiple hybrid measures, I relied on the individual bivariate correlations to assess if those variables tend to present the same measure.
[487] Cf. Cheung/Chan (2004), p. 782.
[488] Cf. Lipsey/Wilson (2001), p. 73ff; Rustenbach (2003), p. 41ff.
[489] A more detailed coding report scheme can be found within the appendix.

wide variance between the effect sizes of the primary studies indicates that there is a systematical effect on the results, and thus, that moderators are present. A moderator analysis will then try to identify and consolidate sub-groups, which are homogenous in them, yet heterogeneous among them.[490]

Each study is, however, subjected to various possible imperfections, which can distort the meta-analysis results. Hunter and Schmidt (2004) specify eleven possible imperfections (artifacts) of which ten can be corrected if the database of the primary studies is sufficient.[491] The biggest source of error is the so-called *sampling error*, i.e., the validity of the study varies randomly from the population value because of sampling errors. For the majority of meta-analyses within business economics this is at the same time the only imperfection that researchers can correct, due to missing data within the primary studies, except for using a global reliability to adjust the so-called *measurement error*.[492] The latter refers to errors of measurement in the dependent and independent variables, since the study validity for a test will be systematically lower than true validity, to the extent that these variables are measured with random error and are thus not perfectly reliable.[493]

To eliminate the effect of *sampling error* from a meta-analysis, researchers need to derive the distribution of population correlations from the distribution of observed correlations. The mean of the correlation coefficients weighted with the sample size ($\bar{r}$) is the best estimate for the population correlation coefficient (ρ):[494]

$$\bar{r} = \frac{\sum (N_i r_i)}{\sum N_i}$$

where r_i is the correlation in study i and N_i is the sample size in study i. The corresponding *variance* across the studies is the frequency-weighted average squared error:[495]

$$s_r^2 = \frac{\sum \left[N_i \left(r_i - \bar{r} \right)^2 \right]}{\sum N_i}.$$

[490] Cf. Cortina (2003), p. 416.
[491] Cf. Hunter/Schmidt (2004), p. 76.
[492] Cf. Schmidt et al. (1985), p. 697ff.
[493] Cf. Hunter/Schmidt (2004), p. 76.
[494] Cf. Hunter/Schmidt (2004), p. 81. Hunter et al. (1982) assert that the sample size weighting impedes distortions. The authors decline the request for transforming z-values for mean correlation coefficients that result in negative distortions, because there would be bigger positive distortions when using z-values. Cf. Hunter et al. (1982), p. 40; Hunter/Schmidt (2004), p. 82. For an empirical study on the qualification of the population coefficient estimation formula see Cornwell/Ladd (1993).
[495] Cf. Hunter/Schmidt (2004), p. 81.

The observed variance consists of the variation in population correlations (if present) and variation in sample correlations produced by sampling error within each of the studies. The latter results from differences between the sample correlations (r) and the real population correlations (ρ), and is denoted by *e*.[496] Although the sampling error varies randomly, its expected value is zero since with a sufficient amount of studies it will be balanced. And because of these countervailing effects, the mean sampling error does not measure the size of the sampling error, which is why it is necessary to square the errors in order to impede any compensation. To assess the population correlation variance one has to subtract the sampling error variance from the correlation coefficient variance. So, based on the formula for the sampling error variance for one study

$$s_{e_i}^2 = \frac{\left(1-\rho_i^2\right)^2}{N_i - 1},$$

the *sampling error variance* for the meta-analysis can be derived by weighting the studies' correlations by sample size N_i:[497]

$$s_e^2 = \frac{\sum\left(N_i S_{e_i}^2\right)}{\sum N_i}; \text{ where } S_{e_i}^2 = \frac{\left(1-\rho_i^2\right)^2}{N_i - 1}.$$

Assuming furthermore that $N_i / (N_i - 1)$ is close to unity and that average $(\rho^2) \cong (\text{average } \rho)^2$, then the following approximation applies:

$$s_e^2 = \frac{\left(1-\bar{r}^2\right)^2 K}{T}$$

where K is the number of studies and $T = \sum N_i$ is the total sample size. Thus,

$$\text{est } \sigma_\rho^2 = \sigma_r^2 - \sigma_e^2 = \sigma_r^2 - \frac{\left(1-\bar{r}^2\right)^2 K}{T}$$

is the corresponding *estimate of the variance of population correlations* (residual variance).[498] If there is true variation across studies after the correction of sample errors, then there must be moderator(s) present to account for such variance.[499] If the residual variance equals zero, the population can be considered homogeneous. However, even with homogeneity there is a

[496] Cf. Hunter/Schmidt (2004), p. 84.
[497] I.e., the sampling error variance across studies equals the average of the sampling error variance within each individual study. Cf. Hunter/Schmidt (2004), p. 85ff.
[498] Cf. Hunter/Schmidt (2004), p. 87.
[499] Cf. Viswesvaran/Sanchez (1998), p. 78f.

possibility of residual variance due to rest distortions within the individual studies; that is why it is necessary to conduct homogeneity tests. The most frequented and accepted homogeneity tests are *credibility intervals* and the *75% rule* of Hunter and Schmidt (2004).[500]

Credibility intervals address the question of whether moderators are in operation; the intervals are created by using the corrected standard deviation around the mean corrected effect size. Only if this interval is sufficiently large or includes zero, one can assume that sub-groups exist and that moderators are in operation, which then justifies a moderator analysis. Accordingly, if the interval is small or does not include zero, there are no moderators in operation and the mean corrected effect size is probably the best estimate of a homogenous population parameter.[501]

Hunter and Schmidt's *75% rule* tests the homogeneity of the studies with regard to the proportion of the variance due to the corrected distortions compared to the observed variance. If 75% or more of the variance is due to artifacts, the authors suggest that the remaining 25% is likely to be due to artifacts for which no corrections have been made and thus that the population is homogeneous.[502]

If the results of the homogeneity tests allude at a heterogeneous population, a moderator analysis follows, which tries to identify moderating variables for the heterogeneity of the correlation coefficients. Therefore, moderator variables derived from the theory or hypothesis can be used to group the observed correlations into subsets. Within each subset, individual meta-analyses are conducted to reveal possible moderators. The latter is confirmed if the average correlation varies from subset to subset and if the corrected variance will average lower in the subsets than for the data as a whole.[503] Furthermore, researchers can assess the significance of the differences between subgroups using the critical z-value:

$$z = \frac{C}{\sqrt{Var(C)}}$$

[500] Hunter and Schmidt object to use χ^2 -Tests; they argue that with large sample-sizes, those tests produce significant results even with trivial variances, which then leads to rejecting H_0 of a homogenous population. Cf. Hunter/Schmidt (2004), p. 401. See also Viswesvaran/Sanchez (1998) and Cortina (2003) for more details on moderator search within meta-analyses.

[501] Cf. Whitener (1990), p. 317. Koslowsky and Sagie's (1993) empirical study on credibility intervals revealed that the distinguishing value between small and large intervals is about 0.11. Cf. Koslowsky/Sagie (1993), p. 698.

[502] Cf. Hunter/Schmidt (2004), p. 401; Koslowsky/Sagie (1993), p. 695; Koslowsky/Sagie (1994), p. 562; and Schmidt et al. (1988) as well as Rasmussen/Loher (1988) for more details.

[503] Cf. Hunter/Schmidt (2004), p. 90; Stamm/Schwarb (1995), p. 14; Viswesvaran/Sanchez (1998), p. 79f.

where C is the difference between the weighted average correlation coefficients of the subgroups and Var (C) is the sum of the correlation coefficients variance of the subgroups, first divided by the individual number of studies.[504] Using a 5% level of significance, the critical z-value is 1.645.

Additionally, the significance of the weighted average correlation coefficients has to be evaluated for both the subgroups as well as for the whole sample, by building a *confidence interval* around the mean effect size. For a homogeneous population, confidence intervals use the standard error for the mean effect sizes around the sample-size weighted mean effect size, i.e., the standard deviation results from the root of the sampling error variance divided by the number of studies. For a heterogeneous population, the standard deviation results from the root of the observed variance divided by the number of studies. If the confidence interval does not include zero, the effect size estimate of the meta-analysis is significant for the chosen level of confidence.[505]

In the past, there has been a lot of confusion regarding the differences between and the use of credibility and confidence intervals. Whitener (1990) clarified this problem within her paper, and asserts that researchers should use both interval types since they aim at different subjects: (a) credibility intervals with the corrected standard deviation to assess the influence of moderators, and (b) confidence intervals using the standard error of the mean effect size, if they want to assess the accuracy of the sample-size weighted mean effect size.[506]

Since it has long been suspected that the published literature is biased toward studies showing statistically significant findings, researchers should also account for a possible upward bias of the mean effect size due to sampling bias of the systematic omission of difficult-to-find studies. Rosenthal (1979) developed an additional statistic called the *fail-safe N*, which estimates the number of unpublished studies reporting results that are null, needed to reduce the cumulated effect across studies to the point of non-significance.[507] To develop N, the correlation coefficients have to be transformed into z-values, whereas for independent studies the variance for each z-value equals zero. Hence, the variance of the sum of z-values for k studies is equivalent to the number of studies. Through inserting the critical z-value of 1.645 for a 95% confidence interval into the z-formula for the population, the following formula evaluates the fail-safe N:

[504] Cf. Hunter/Schmidt (1990), p. 437f.
[505] Cf. Lipsey/Wilson (2001), p. 115; Whitener (1990), p. 317; Hunter/Schmidt (1990), p. 426ff.
[506] Cf. Whitener (1990), p. 317.
[507] Cf. Rosenthal (1979), p. 638ff; Lipsey/Wilson (2001), p. 165f.

$$N = \frac{k}{2.706}\left[k\bar{z}_k^2 - 2.706\right].$$

4.2.1.5 Presenting and interpreting the results

The results of a meta-analysis are presented by first *conducting an outlier analysis* and second *discussing the meta-analysis coefficients*.[508] It is likely that outliers exist with meta-analytic data sets. Thus, the outlier analysis is conducted using the sample adjusted mean deviance; if the results seem exceptionally unusual then those tests should not be included. Here, an outlier is a coefficient of a primary study that does not appear to be consistent with the other study coefficients. This can be due to errors in data collection, of computation, or an unusual feature of the study design or the study subjects.[509] Since the presence of such outliers can alter the conclusions reached, one should either eliminate or recode them. For the present meta-analysis, I followed Lipsey and Wilson's (2001) procedure and identified each effect size that was more than 3 times the standard deviation from the mean of all the effect sizes, and recoded those to the value of 3 standard deviations in order to not lose the data they represent.[510]

The meta-analysis coefficients are reported providing results for the observed correlation, the residual variance, and confidence and credibility intervals for both the population as well as – if heterogeneity is present – for the subgroups. Moreover, the fail-safe N and the z-values for discriminating between the sub-samples will be included in the report.

It is important to carefully document each step to guarantee traceability as well as facilitate the control for objectivity, validity and reliability.[511] While interpreting the results, there are often difficulties regarding the assessment of effect sizes. For interpreting those effect sizes, one needs certain references. In general, researchers rely on Cohen's (1977, 1988) classification of low, medium and high effect sizes as shown in Table 44:[512]

Low	Medium	High
$r \leq 0.1$	$0.1 < r < 0.5$	$r \geq 0.5$

Table 44: Cohen's Classification of Correlation Coefficients

[508] Cf. Roth et al. (1996), p. 552f; Stamm/Schwarb (1995), p. 16ff.
[509] Cf. Huffcutt/Arthur (1995), p. 327. Similar Cohen (1990), p. 1305; Roth et al. (1996), p. 552.
[510] Cf. Lipsey/Wilson (2001), p. 108.
[511] Cf. Rustenbach (2003), p. 251ff for a detailed description of presenting integrative results.
[512] Cf. Lipsey/Wilson (2001), p. 146; Cohen (1988), p. 25ff, p. 77ff and p. 284ff.

4.2.2 Advantages of Meta-Analyses

If there is already a large number of heterogeneous findings within empirical research, integrating such findings seem to offer a more fruitful approach than conducting another primary study. Through integrating such research, one can evaluate the overall effect as well as identify reasons for differences within the primary studies. Thus, the value of empirical research within RBT can be extremely improved if it enables its readers to conclude on generalizations; and such generalizations are best based on meta-analyses.[513]

Compared with other methods for summarizing and integrating empirical results, meta-analyses are extensively standardized and systematized, and one of the most salient ways to quantitatively synthesize research findings.[514] Whereas literature reviews group studies and consider them together, only meta-analyses treat a group of studies as a data set from which to derive a general and numerical estimate of the strength of a relationship.[515] Each individual step and specification of meta-analyses needs to be documented and open to scrutiny, which facilitates higher objectivity. Hence, the research summarizing process is explicit and systematic, so the reader can assess the author's assumptions, procedures, evidence, and conclusions.[516] Moreover, meta-analyses exactly quantify the proposed relationship, while they also allow identifying interactions between dependent and independent variables and test new hypotheses.[517] So, beyond overcoming difficulties associated with single primary studies (e.g., sampling error or measurement error), meta-analyses also enable researchers to synthesize the findings of those studies and test hypotheses that were not testable before.[518] And due to high levels of systematization and quantification, meta-analyses enable the handling of many primary studies.[519]

Single primary studies have distortions, such as sampling errors, which can not be corrected.[520] Also, within empirical primary studies researchers often use Fisher theory-tests where 95% high faults of type number two with false hypotheses null are not detected.[521] Here, the use of effect sizes allows quantifying the direction and the magnitude of the effect

[513] Cf. Eden (2002), p. 841; Barrilleaux-Pizzolatto/Chhokar (1985), p. 16.
[514] Cf. Chambers (2004), p. 35.
[515] Cf. Leviton/Cook (1981), p. 233.
[516] Cf. Lipsey/Wilson (2001), p. 7.
[517] Cf. Green/Hall (1984), p. 40.
[518] Cf. Eden (2002), p. 841. Eden suggests, for example, the variability of the relationship between two variables or moderator effects once the variance owing to artifacts has been removed.
[519] Cf. Lipsey/Wilson (2001), p. 6; Eden (2002), p. 841.
[520] Cf. Schmidt (1992), p. 1178.
[521] Cf. Hunter et al. (1982), p. 19ff.

while also conducting a significance test.[522] The use of confidence intervals inform about the significance of the results but also, contrary to primary studies' p-value, about the allowable specifications of the dependent variable regarding the underlying level of significance.[523] Furthermore, non-significant results on the level of the individual study can result in significant results on the level of the meta-analysis.[524]

Through broader secured results and acknowledgement of moderating variables, meta-analyses can identify gaps within the present empirical literature. Also, the findings of meta-analyses can raise new theoretical questions for future research and point out the best directions for further theory development.[525] Moreover, research areas can be identified that do not need further empirical exploration, which helps allocating rare resources within the empirical research field of primary surveys.[526]

4.2.3 Criticism of Meta-Analyses

Even though meta-analyses overcome most of the weaknesses of secondary analyses, they are the subject of some criticism. Most of the critics dement the following five problems: (1) garbage-in-garbage-out; (2) publication bias (file-drawer problem); (3) apples and oranges; (4) dependence of primary results; and (5) high operating expenses (time and effort).

The first problem, g*arbage-in-garbage-out*, refers to the accusation that meta-analyses tend to integrate qualitative, high-grade methodological studies with lower quality studies with the same importance. There are several ways to address this problem: (a) researchers can assess the value of these studies and weigh them according to their value, which would, however, raise difficulties regarding the criteria of assessment and their objectivity; (b) researchers can exclude lower quality studies, which would, however, result in a huge loss of information; or (c) researchers can conduct moderator analysis according to the studies' source and methods, which seems to be the best approach, since no unverified assumptions have to be made upfront.[527]

The second problem of *publication bias*, which is also known as the so-called *file drawer problem*, argues that due to the bias in support of publicizing significant results, getting a

[522] Cf. Cohen (1990), p. 1308; Lipsey/Wilson (2001), p. 6.
[523] Cf. Cohen (1990), p. 1310.
[524] Cf. Rosenthal/DiMatto (2001), p. 64.
[525] Cf. Eden (2002), p. 843f.
[526] Cf. Green/Hall (1984), p. 40f.
[527] Cf. Lipsey/Wilson (2001), p. 9; Stamm/Schwarb (1995), p. 21; Barrilleaux-Pizzolatto/Chhokar (1985), p. 18. The present meta-analysis primarily relies on studies from high quality journals that have undergone an intensive screening process. Nonetheless, a moderator analysis will be provided.

representative sample for the meta-analysis is very difficult, since insignificant results tend to end up in the "file drawer".[528] The discrepancy between published and unpublished research can, however, be assessed through using, for example, Rosenthal's (1979) fail-safe N as outlined in chapter 4.2.1.4. This statistical procedure allows the estimation of the number of non-significant results necessary to obtain an overall non-significant result within the meta-analysis. Yet, as Green and Hall (1984) point out, the necessary number of non-significant studies has to be implausibly high to result in an overall non-significant effect size.[529] Besides the publication bias, there is also personal bias, i.e., the researchers' subjective choices in including and coding the studies, which might distort the results.[530] Barrilleaux-Pizzolatto and Chhokar (1985) name three possible distortions in this respect: (a) a narrow literature search; (b) excluding studies on methodological grounds; and (c) excluding studies because their theoretical constructs are considered irrelevant.[531] Another problem, in this context, is the sizable discrepancy between the number of studies located and the actual inclusion of the number of studies used in meta-analyses, which most of the time is due to the lack of data provided.[532]

The third problem, referred to as *apples and oranges,* accounts for the criticism of not properly integrating comparable tests within meta-analyses.[533] For instance, critics assert that aggregating results that use different research techniques and different operationalization measures is not appropriate if those techniques and measures are not similar enough.[534] Advocates of meta-analyses usually attend to this accusation in quoting Smith et al. (1980) on this subject: "Indeed the approach does mix apples and oranges, as one necessary would do in studying fruits."[535] They argue that it is not a problem of meta-analysis in general, rather a question of the authors' reasonable argumentation of combining apples and oranges to fruits. Also, comparing studies which are the same in all respects would not lead to any new insights since they would obviously yield the same results; hence, only studies that are different need

[528] Cf. Lipsey/Wilson (2001), p. 71; Barrilleaux-Pizzolatto/Chhokar (1985), p. 16; Stamm/Schwarb (1995), p. 21; Lam/Kennedy (2005), p. 169; Chambers (2004), p. 36.
[529] Cf. Green/Hall (1984), p. 47. For example, Green and Hall (1984) refer to a study which integrated 345 primary tests. To question their significance, one would need approximately 65,000 non-significant results.
[530] Cf. Stamm/Schwarb (1995), p. 22.
[531] Cf. Barrilleaux-Pizzolatto/Chhokar (1985), p. 19.
[532] Chambers (2004), p. 36. Chambers refers to two studies, e.g., Bangert-Drowns et al. (1985) who located around 500 articles but over 90% were not suitable as well as Gillingham and Guthrie (1987) who reported that their sample could just use 6% of the literature found due to the inability to calculate effects from the lack of data provided. Cf. Chambers (2004), p. 36.
[533] Cf. Stamm/Schwarb (1995), p. 20f; Barrilleaux-Pizzolatto/Chhokar (1985), p. 18; Chambers (2004), p. 36; Rosenthal/DiMatto (2001), p. 68.
[534] Cf. Chambers (2004), p. 36.
[535] Smith et al. (1980), p. 47.

to be compared.[536] Furthermore, to correct this issue, meta-analysts can code the different techniques and measures to test whether the results are too dissimilar.[537]

The fourth problem of the *dependence of primary results* refers to the multiplicative usage of one sample data base for several publications. These studies are, of course, statistically not independent. As a solution, researchers can weight the studies which are based on the same sample so that overall they add up to "1". Additionally, homogeneous subgroups can be built, whereas of the overlapping studies using the same sample only one result will be allowed for each subgroup.[538]

Finally, the last problem argues *high operating expenses* due to time and cost efforts as well as the amount of expertise it takes.[539] Especially with respect to the selection and computation of appropriate effect sizes and the application of statistical analysis to them, meta-analyses are challenging procedures. Onwuegbuzie et al. (2003) discuss a similar problem in this respect, i.e., the sensitivity of effect sizes. The authors discuss nine factors that should be considered with more accuracy when investigating effect sizes: the research objective, research design, effect-size measure, interpretation guidelines, sampling issues, distribution non-normality, score variability, measurement error, and scale of measurement.[540]

However, taking all these problems into account, Barrilleaux-Pizzolatto and Chokar (1985) succinctly resume that "…major contributions have already been made through meta-analysis, and the benefits of meta-analysis appear to be well worth the problems associated with it."[541] The following chapter will therefore reveal the results of the RBT meta-analysis.

4.2.4 RBT Meta-Analysis Results

The ***whole sample*** includes 240 correlations (k) with a total sample size of 89,957 (T) and shows a weighted *mean correlation of 0.076* ($\bar{r}$); the residual variance is 0.008 (s^2_ρ). The credibility interval is rather small, yet, the sampling error variance only explains 25% of the observed variance. Therefore, the sample is assumed to be heterogeneous. The 95% confidence interval does not include null; thus, the estimation population correlation is significant for the chosen level of confidence. Moreover, the fail-safe N estimates a number of

[536] Cf. Stamm/Schwarb (1995), p. 21; Barrilleaux-Pizzolatto/Chhokar (1985), p. 18.
[537] Cf. Chambers (2004), p. 36.
[538] Cf. Stamm/Schwarb (1995), p. 20; Rosenthal/DiMatto (2001), p. 67. These studies can be detected by their sample descriptions.
[539] Cf. Lipsey/Wilson (2001), p. 7.
[540] Cf. Onwuegbuzie et al. (2003), p. 38.
[541] Barrilleaux-Pizzolatto/Chokar (1985), p. 20.

6,286, i.e., a very high number of necessary unpublished studies reporting results that are null to reduce the cumulated effect across studies to the point of non-significance. Hence, a publication bias seems unlikely.

The results thus show a small yet significant positive relationship between resources and performance.[542] Since the sampling error variance only explained 25% of the observed variance, there seem to be further influential determinants for this relationship. These will be analyzed within the subsequent ***moderator analysis***, which starts with the evaluation of the four propositions, and then continues with further model-related and explorative moderators. Here, I will perform a separate meta-analysis for each subgroup.[543]Table 45 summarized the meta-analytic results including all moderator-analyses. In addition, Figure 7 shows the weighted mean correlations and their confidence intervals (95%) for the propositions and the main resource categories.

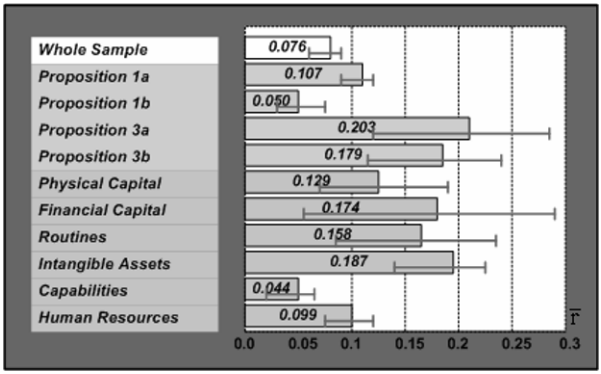


Figure 7: Correlation Coefficients and Confidence Intervals

[542] Correlation coefficients can not determine any causality between two variables, i.e., performance could also lead to more and better resources. However, the focus of the studies included within this meta-analysis is clearly on the impact of resources on performance. Therefore, causality in the opposite direction is rather improbable.

[543] Due to small sample sizes in terms of tests, each moderator-analysis is based on the whole sample, i.e., the whole sample will be partitioned into the respective sub-groups. Thus, the present meta-analysis is not capable of hierarchically evaluating the different sub-groups in more detail.

PREDICTOR	K	N	$\overline{r}$	S_r^2	S_ρ^2	S_e^2 / S_r^2	CrI (95%)	CoI (95%)	Fail-safe N	z
Whole Sample	240	89,957	0.076	0,01	0,008	0,252	0,060:0,091	0,063:0,088	6,286	-
Propositions [B]										
P 1a	149	29,679	0.107	0.014	0.009	0.354	0.089:0.126	0.088: 0.126	1,22	4.111***; [a]
P 1b	68	55,934	0.050	0.006	0.005	0.186	0.040:0.061	0.031: 0.070	824	4.447***; [b]
P 3a	8	606	0.203	0.003	-0.009	4.037	0.221:0.185	0.127: 0.280[A]	47	7.036***; [c]
P 3b	15	3,738	0.179	0.013	0.009	0.287	0.161:0.198	0.121: 0.237	20	4.142***; [d]
Resource Categories [B]										
Physical Capital	15	1,17	0.129	0.012	0.000	1.014	0.129: 0.128	0.072:0.185[A]	12	2.845**; [e]
Financial Capital	7	1,981	0.174	0.024	0.021	0.137	0.133:0.215	0.059:0.289	62	2.184*; [f]
Routines	9	626	0.158	0.010	-0.004	1.381	0.165:0.151	0.082:0.234[A]	7	3.337***; [g]
Intangible Assets	25	3,785	0.187	0.012	0.006	0.526	0.176:0.198	0.145:0.229	552	6.187***; [h]
Capabilities	77	45,671	0.044	0.005	0.003	0.341	0.038:0.051	0.029:0.060	814	3.872***; [i]
Human Resources	84	29,036	0.099	0.011	0.009	0.248	0.082:0.116	0.076:0.122	3,694	3.577***; [j]
Resource Sub-Categories (with ≥ 3 studies pro category) [B]										
Patents	5	464	0.091	0.026	0.015	0.410	0.062:0.121	-0.049:0.232	-1	
Reputation	6	1,901	0.198	0.003	0.000	0.968	0.197:0.198	0.154:0.241A	125	6.326***; [k]
Technological Capabilities	16	2,273	0.173	0.011	0.004	0.624	0.166:0.181	0.123:0.224	180	2.657**; [l]
Manufacturing Capabilities	8	1,963	0.071	0.007	0.003	0.609	0.066:0.076	0.014:0.127	3	2.035*; [m]
R&D Capabilities	7	779	0.149	0.013	0.005	0.642	0.139:0.158	0.063:0.234	14	2.645**; [n]
Organizational Capabilities	14	13,082	0.026	0.003	0.002	0.329	0.022:0.030	-0.004:0.056	1	4.917***; [o]
Marketing Capabilities	7	1,004	0.111	0.009	0.003	0.721	0.106:0.116	0.039:0.183	23	1.955*; [p]
Management (HR)	16	2,465	0.147	0.009	0.003	0.668	0.141:0.153	0.100:0.194	155	2.183*; [q]
HRM Practices	28	8,689	0.105	0.009	0.006	0.354	0.094:0.116	0.070:0.140	251	
HR Skills and Knowledge	38	17,752	0.088	0.012	0.010	0.170	0.068:0.108	0.053:0.124	1,773	
Performance-Level [C]										
Firm Level Performance	193	79,974	0.065	0.008	0.006	0.301	0.054:0.076	0.052:0.078	4,345	4.110***
Lower Level Performance	47	9,983	0.159	0.023	0.018	0.197	0.123:0.195	0.116:0.202	1,207	
Performance Measure-Types [B]										
Accounting Returns	54	12,171	0.083	0.014	0.010	0.314	0.064:0.101	0.051:0.114	291	1.754*; [r]
Stock Market	21	4,207	0.109	0.008	0.003	0.635	0.104:0.115	0.072:0.147	77	2.761**; [s]
Growth Measures	29	6,093	0.123	0.008	0.003	0.584	0.117:0.130	0.091:0.156	191	3.867***; [t]
Hybrids	89	57,503	0.052	0.006	0.004	0.258	0.043:0.061	0.036:0.068	1,186	1.713*; [u]
Operational Performance	47	9,983	0.159	0.023	0.018	0.197	0.123:0.195	0.116:0.202	1,207	1.709*; [v]

PREDICTOR	K	N	$\overline{r}$	S_r^2	S_ρ^2	S_e^2 / S_r^2	CrI (95%)	CoI (95%)	Fail-safe N	z
Methodological Differences										
Primary Data Sources[C]	97	18,515	0.104	0.013	0.008	0.405	0.089:0.119	0.082:0.126	294	3.032**:[w]
Secondary Data Sources[C]	82	62,139	0.059	0.007	0.006	0.179	0.047:0.071	0.041:0.078	1,033	3.385**:[x]
Both Data Sources[C]	61	9,303	0.129	0.021	0.014	0.306	0.101:0.157	0.093:0.165	572	
Data-Type (Proxy)[B]	136	74,058	0.059	0.008	0.006	0.227	0.047:0.072	0.044:0.074	1,661	6.447**:[y]
Data-Type (Construct)[B]	104	15,899	0.151	0.015	0.009	0.422	0.134:0.168	0.127:0.174	2,012	
Publication Source A-Rank[B]	168	80,837	0.064	0.009	0.007	0.234	0.050:0.077	0.049:0.078	3,221	4.815**:[z]
Publication Source B-Rank[B]	21	4,658	0.190	0.013	0.009	0.313	0.172:0.208	0.141:0.240	338	6.629**:[aa]
Publication Source C-Rank[B]	51	4,462	0.173	0.011	0.000	0.965	0.172:0.173	0.144:0.201[A]	41	
Publication Year 1984-99[B]	119	70,997	0.050	0.006	0.004	0.277	0.041:0.058	0.036:0.064	1,372	9.247**:[ab]
Publication Year 2000-04[B]	121	18,96	0.172	0.015	0.009	0.396	0.154:0.190	0.150:0.194	2,493	
Content-related Differences										
Single Industries[B]	118	63,736	0.062	0.009	0.008	0.196	0.047:0.076	0.044:0.079	1,569	3.587**:[ac]
Multiple Industries[B]	122	26,221	0.109	0.012	0.007	0.394	0.095:0.123	0.090:0.128	1,065	
Research Area: BPS[C]	25	4,431	0.151	0.017	0.012	0.315	0.128:0.174	0.100:0.203	151	2.370**:[ad]
Research Area: HR[C]	63	18,126	0.080	0.014	0.011	0.246	0.059:0.101	0.051:0.109	294	3.175**:[ae]
Research Area: O&MT[C]	135	64,66	0.065	0.008	0.006	0.257	0.053:0.076	0.050:0.080	1,137	
Research Area: T&IM[C]	11	958	0.107	0.017	0.006	0.652	0.095:0.199	0.029:0.184	6	

With: k = number of correlations; N = total sample size; r = weighted mean correlation; s^2_r = observed variance; s^2_ρ = residual variance; $s^2_e / s^2_r = 75\%$ rule (sampling error variance / observed variance); CrI (95%) = credibility interval (95%); CoI (95%) = confidence interval (95%); A = CoI for homogeneous samples, i.e., sampling error variance instead of observed variance is been used; B = Moderator approved; C = Moderator not approved.

z-values: (a) P 1a vs. P 1b; (b) P 1a vs. P 3a; (c) P 1b vs. P 3a; (d) P 1b vs. P 3b; (e) physical capital vs. capabilities; (f) financial capital vs. capabilities; (g) routines vs. capabilities; (h) intangible assets vs. capabilities; (i) capabilities vs. human resources; (j) intangible assets vs. human resources; (k) reputation vs. organizational capabilities; (l) technological capabilities vs. manufacturing capabilities; (m) manufacturing capabilities vs. management (HR); (n) R&D capabilities vs. organizational capabilities; (o) technological capabilities vs. organizational capabilities; (p) management (HR) vs. skills and knowledge HR; (q) technological capabilities vs. HRM practices; (r) accounting returns vs. growth measures; (s) stock markets vs. hybrids; (t) growth measures vs. hybrids; (u) hybrids vs. accounting returns; (v) stock market vs. operational performance; (w) primary vs. secondary data sources; (x) secondary vs. both data sources; (y) proxy vs. construct; (z) A-Rank vs. B-Rank; (aa) C-Rank vs. A-Rank; (ab) 1984-99 vs. 2000-04; (ac) single vs. multiple industries; (ad) BPS vs. HR; (ae) BPS vs. O&MT.

Significance level: * 0.05; ** 0.01; *** 0.001.

Table 45: Results Resource-based Theory Meta-Analysis

Regarding the *propositions*, they provide different, yet all positive, correlation coefficients: proposition 1a $\overline{r} = 0.107$, proposition 1b $\overline{r} = 0.050$, proposition 3a $\overline{r} = 0.203$ and proposition

3b $\bar{r} = 0.179$. Since the confidence intervals do not include null, all coefficients are significant. As Table 45 outlines, the residual variance of proposition 3a is negative, which can occur due to inaccuracies within the sampling error variance estimation and especially affects meta-analyses with small numbers of correlations. Accordingly, this sub-sample is considered to be homogeneous. The other sub-samples, however, still seem to be heterogeneous, i.e., a maximum of 35% of the observed variance is explained through sampling error variance. The correlations within the sub-samples are distinctly different from each other and the averaged residual variance of the sub-groups is less compared with the residual variance of the whole sample. Thus, both conditions support the moderators. Moreover, the z-values of 4.111 to 7.036 indicate that the sub-samples are significantly different from each other.

Even though all correlations are significant positive in the direction of the theory, the results have to be carefully interpreted. With 149 and 68 correlations as well as a fail-safe N of 1,220 and 824, the results of the first two propositions are rather robust. The latter two propositions, however, are only based upon 8 and 15 correlations and show very few fail-safe N. So, in spite of the high correlations of the performance impact of strategic resources under high information asymmetry, those results are rather feeble. Accordingly, proposition 1a is supported with a relatively moderate correlation coefficient, proposition 1b is only weakly supported due to a relatively low correlation coefficient, whereas propositions 3a and 3b are both supported with relatively high correlation coefficients, however, based on less robust results.

For the next moderator analysis, the whole sample has been divided into sub-groups of different *resource categories*. These proved to be moderators of the resource-performance relationship: the average residual variance of the sub-groups is less compared with the residual variance of the whole sample, and the correlations within the sub-samples are distinctly different from each other. Also, the z-values of 2.184 to 6.187 are above the critical value of 1.645. Regarding the sub-groups, intangible assets showed the highest correlation with $\bar{r} = 0.187$, followed by financial capital with $\bar{r} = 0.174$, routines with $\bar{r} = 0.158$, physical capital with $\bar{r} = 0.129$, human resources with $\bar{r} = 0.158$, and capabilities with $\bar{r} = 0.044$. All resource categories were significant according to the confidence intervals. Two of the sub-groups, physical capital and routines, show no and respectively negative residual variance and are thus expected to be homogeneous. For the other sub-groups, there still seem to be moderators present (the 75%-rule varies between 13% and 52%). Looking at the

robustness of these results, again there are two subgroups with rather few tests, i.e., financial capital and routines, and two tests with rather few fail-safe Ns, i.e., physical capital and routines. In spite of the small test number, the relatively large fail-safe N of the sub-category financial capital results from the large sample size of this sub-group. Accordingly, these three sub-groups are supported with quite high correlation coefficients, however, with less significance. The other three categories, i.e., intangible assets, capabilities, and human capital show rather robust results, i.e., high test numbers and high fail-safe Ns. Yet, only intangible assets provide a comparably high correlation coefficient, whereas the other two categories are only weakly supported. In view of these results, intangible assets, such as, for instance, culture, reputation, or brand name received the most support in terms of effecting performance. Surprisingly, the effect of capabilities on performance was only weakly supported with the smallest of all sub-group correlations. Since the sampling error variance within this sub-group only explained 32% of the observed variance, their might be further moderators present. The next moderator analysis will attend to a more fine-grained level in this respect, i.e., the resource sub-categories.

Of the *resource sub-categories*, merely ten categories provided enough studies and tests to conduct a moderator analysis, which could be affirmed since the correlations between the resource's sub-categories differ from each other. Moreover, the z-values vary from 1.955 (i.e., management (HR) vs. skills and knowledge HR) to 6.326 (i.e., reputation vs. organizational capabilities). And most importantly, the average residual variance of the sub-groups is less compared with the residual variance of the whole sample.

Regarding intangible assets, the sub-category of patents could not be confirmed: patents showed a rather small correlation ($\bar{r} = 0.091$) which was not significant according to the confidence interval, whereas reputation showed the highest significant correlation of the resource sub-categories ($\bar{r} = 0.198$). Regarding the latter, the reputation sub-category seems to be homogeneous since the sampling error variance explained about 97% of the observed variance and since the credibility interval is very small. Moreover, the fail-safe N of 124 indicates that this result is rather robust. Within the different capabilities' sub-categories, technological capabilities was the most frequented category and showed both the highest correlation coefficient ($\bar{r} = 0.173$) and the most robust results compared with the other capability sub-categories (fail-safe N = 180). Furthermore, with 62% of explained observed

variance, this category seems to be rather homogeneous.[544] As for the other capability sub-categories, R&D capabilities and marketing capabilities also showed rather high – and, according to the confidence intervals, significant – correlation coefficients ($\bar{r} = 0.149$ and $\bar{r} = 0.111$) and both, again, seem to be homogeneous (64% and 72% explained observed variance). Manufacturing capabilities only produced a correlation coefficient of $\bar{r} = 0.071$, which, even though significant, does not seem to be robust with respect to the corresponding fail-safe N = 3. Surprisingly, organizational capabilities showed a very low correlation coefficient ($\bar{r} = 0.026$) which was not significant. Concerning the human capital sub-categories, managerial human resources such as CEOs and TMTs showed the highest correlation coefficient with $\bar{r} = 0.147$ (significant according to the confidence interval); since almost 67% of the observed variance is explained through the correction of sampling errors, this sub-category seems to be homogeneous. The remaining two categories, HRM practices and HR skills and knowledge, also offer significant, yet lower correlation coefficients, i.e., $\bar{r} = 0.105$ and $\bar{r} = 0.088$.

The next moderator analysis, focusing on different *performance-levels* (i.e., lower-level vs. firm-level performance), could not be confirmed. The average residual variance of the sub-groups was higher compared with the residual variance of the whole sample. Thus, those results have to be disregarded.

The moderator analysis of the different *performance measure-types* showed a lower average residual variance of the sub-groups compared with the residual variance of the whole sample. Moreover, the correlations between the different performance measure-types are distinctly different from each other and the critical z-values range from 1.709 (i.e., stock market vs. operational performance) to 3.867 (i.e., growth measures vs. hybrids). All of the sub-categories showed significant results according to the confidence intervals, which are also rather robust in terms of the corresponding fail-safe Ns. Interestingly, operational performance measures produced the highest correlation coefficient with $\bar{r} = 0.159$, followed by growth measures ($\bar{r} = 0.123$), stock market measures ($\bar{r} = 0.109$), accounting returns ($\bar{r} = 0.083$), and hybrids ($\bar{r} = 0.052$). Besides the stock market category, which points to a homogeneous sub-sample with 63% of explained observed variance, the remaining four

[544] Koslowsky and Sagie (1993) explicate that relative percentages of variance explained by each one of the correctable artifacts exists. They assert that 80% of total artifactual variance in a study can be ascribed to sampling error variance. Therefore, the authors suggest that in the case where meta-analysis only accounts for sampling error, one could (should) lower the cutoff point for determining the existence of moderators from 75% to 60% of the sample correlation variance (implying that measurement error and range restriction make up 15% of the total sample variance). Cf. Koslowsky/Sagie (1994), p. 562f.

categories still indicate that further moderators are present. For instance, the sampling error variance concerning operational performance tests could only account for 19% of the observed variance. Referring to the vote counting results and, especially, to Figure 6, further moderators thus might be the different lower-level categories (e.g., operations outcomes, service outcomes, etc.). However, merely three levels provided sufficient tests and studies for a moderator analysis (i.e., operations outcomes, HR outcomes, technological development outcomes) and these could not be affirmed as moderators since the average residual variance exceeded the residual variance of the whole sample. Similarly, all additional moderator analysis for the performance measure-types failed for the same reasons.

The additional moderator analysis on grounds of *methodological differences* revealed that data sources did not moderate the resource-performance relationship (higher averaged residual variance), whereas different data-types could be confirmed as moderators.[545] Apparently, resources measured with constructs showed a stronger impact on performance ($\bar{r} = 0.151$) than those based on proxies ($\bar{r} = 0.059$); both correlation coefficients are significant. Additionally, different publication sources as well as the different publication years could be affirmed as moderators.[546] The former were categorized following the journal ranking of A, B, and C-journals. All results were significant according to the confidence intervals, whereas B-journals showed the highest correlation coefficient ($\bar{r} = 0.190$), followed by C-journals ($\bar{r} = 0.173$) and A-journals ($\bar{r} = 0.064$). The latter, i.e., publication years, were roughly categorized into two different periods – studies published between 2000 and 2004 produced a higher correlation coefficient ($\bar{r} = 0.172$) than studies published between 1984 and 1999 ($\bar{r} = 0.050$). Again, both results were significant and robust with respect to the confidence intervals and the corresponding fail-safe Ns.

The moderator analysis focusing on content-related differences explored two different moderators, i.e., single vs. multiple moderators and different research areas. The latter could not be confirmed as moderator since the averaged residual variance exceeded the residual variance of the whole sample; thus, these results have to be disregarded. The former, however, could be affirmed as moderator and revealed that results for studies using multiple

[545] The average residual variance was less than the residual variance of the whole sample, the correlation coefficients were different from each other, and the critical z-value was highly significant (6.447 with $p = 0.001$).

[546] Both revealed differences between the correlation coefficients, significant z-values, and lower average residual variances.

industries produced higher significant correlation coefficients ($\bar{r} = 0.109$) than those using single industry settings ($\bar{r} = 0.062$).[547]

4.2.5 Discussion on the Meta-Analysis Results

First of all, the results of the whole sample showed a small yet significant positive relationship between resources and performance of $\bar{r} = 0.076$, whereas all four propositions were supported with different correlations and confidence intervals. Accordingly, the integration of quantitative research findings on resource-based studies revealed that they, overall, are significantly positive in the direction of the theory. Thus, these results concur with the vote counting results. Interstingly, however, is the rather small correlation coefficient in this connection, which might confound the reader, especially, when recalling the results from McGahan and Porter's (1997) study on "How much does industry matter, really?". Here, the authors showed that industry effects accounted for 19 percent of the aggregated variation in business-specific profits, whereas resource effects (measured as segment-specific effects) showed an even stronger impact, i.e., accounted for 32 percent.[548] So, even though McGahan and Porter's results as well as the results of the present meta-analysis are supportive of RBT, the magnitudes of these relationships vary grately. The differences occur due to conducting artifactual corrections (i.e., identifying and eliminating research mistakes within the primary research field); in fact, small correlations are rather common within meta-analyses in business economics. For instance, Wu (2006) investigated the relationships among social performance (SP), financial performance (FP), and firm size (FS) through meta-analysis, with average affect sizes of 0.166 (SP-FP), 0.007 (FS-FP), and 0.088 (FS-SP).[549] Similarly, Sundaramurthy et al. (2005) explored the relationship between executive and institutional ownership and financial performance, with average affect sizes of -0.001 and 0.088, respectively.[550] And also Geykens et al.'s (2006) recent meta-analysis of transaction cost-based empirical research on organizational boundary decisions mostly provided rather low average affect sizes.[551]

Second, besides the propositions, the following moderators could be confirmed: resource categories, resource sub-categories, performance measure-types, data-type, publication source, publication year, and whether studies explored single or multiple industries.

[547] The average residual variance was less than the residual variance of the whole sample, the correlation coefficients were different from each other, and the critical z-value was significant (2.370 with p = 0.01).
[548] Cf. McGahan/Porter (1997), p. 23. Segement-specific effects encompassed differences between business-segments, e.g., differences in market share, differentiation, organizational processes, heterogeneity in fixed assets, etc.
[549] Cf. Wu (2006), p. 167.
[550] Cf. Sundaramurthy et al. (2005), p. 502.
[551] Cf. Geykens et al. (2006), p. 525.

Surprisingly, different performance-levels, data sources, and research areas could not be affirmed as moderators. In particular, results on the moderator regarding different data sources were unexpected, following the discussion in chapter 3.4. Using primary vs. secondary data should have effectively moderated the resource-performance relationship since primary data is more suitable in this context. Moreover, the moderator referring to different data-types (i.e., proxy vs. construct) relies on somewhat the same argument, yet, could be confirmed. Hence, preferring constructs over proxies while operationalizing resources does in fact strengthen the relationship.

Third, the different resource categories provided some unexpected results, especially compared with the results from vote counting. For example, vote counting results on capability-tests revealed that 78% were supported. However, the correlation coefficient that results from the meta-analysis is, even though statistically significant in the direction of the theory, rather small with $\bar{r} = 0.044$. Results the opposite way around were found for physical and financial capital – vote counting supported about 36% of physical capital tests and merely 8% of financial capital tests, whereas meta-analysis produced relatively high correlation coefficients of $\bar{r} = 0.129$ for physical capital and even $\bar{r} = 0.174$ for financial capital. These differences are explicable, because vote counting is based on the results of the studies' models, whereas meta-analyses are based on the results of the bivariate relationships (here, zero-order correlations). For instance, Miller and Shamsie's (1996) models of the physical resources' impact on performance within unstable environments showed no significant results; yet, the zero-order correlations were relatively high. Hence, these differences emphasize the importance of meta-analytic results. Without the magnitude of a proposed relationship, vote counting results can not be put into perspective and misinterpretations might be the consequence.

Fourth, two results regarding the resources' sub-categories were rather surprising: the non-significance of the correlations of patents and organizational capabilities. Regarding the former, one might be surprised because patents seemed to be widely employed while testing RBT and, as such, a rather attractive resource category. However, some researchers did not evaluate patents as a resource, yet, used patents as a proxy for another resource category. Table 46 outlines the different utilizations of patents within empirical tests of RBT:

Resource in Focus	Operationalization	Authors
patents	**# of patents** (proxy for value)	DeCarolis (2003); DeCarolis & Deeds (1999)
patents	**patent citation rates** (proxy for inimitability) **# of claims listed by each patent** (proxy for non-substitutability)	Markman, Espina, & Phan (2004)
component competence	**# of patents** (proxy for value)	Henderson & Cockburn (1994)
technological competence	**patent citing ratio** (self-citing / N (patents)) (proxy for value) **patent citing ratio** (competitor-citing / N (patents)) (proxy for inimitability)	DeCarolis (2003)

Table 46: The Use of Patents within RBT

As can be seen within Table 46, Henderson and Cockburn (1994) as well as DeCarolis (2003) used patents to represent specific capabilities and competencies of a firm. Thus, those tests were coded for the respective categories. Referring to the discussion within chapter 4.1.3, this alludes again that the alternative utilization of measures leads to difficulties in interpreting and integrating those results. Regarding the latter, i.e., organizational capabilities, on the grounds that the definition of organizational capabilities tends to be rather all-inclusive, these results might be due to imprecise classifications. Looking at the authors' definitions of organizational capabilities, they tend to also comprise other resources such as specific human resource skills, other capabilities (e.g., innovative capabilities, learning capabilities), or specific intangible assets such as organizational culture. For instance, Sharma and Vredenburg (1998) define organizational capabilities as "the coordinating mechanisms that enable the most efficient and competitive use of the firm's assets"[552] and refer to capabilities regarding stakeholder integration, continuous innovation, and organizational learning. In contrast, Spanos and Lioukas (2001) define organizational capabilities as capabilities encompassing "managerial competencies, knowledge and skills of employees together with efficient organizational structure, organizational culture, efficient coordinative mechanisms, strategic planning procedures, and the ability to attract creative employees."[553] Apparently, studies with rather misrepresented or all-embracing resource definitions will either disable a correct integration of results or, worse, lead to inaccurate results.[554]

[552] Sharma/Vredenburg (1998), p. 735.
[553] Spanos/Lioukas (2001), p. 915.
[554] This might also explain the relatively low correlation coefficient regarding the resource sub-category of HR skills and knowledge. A narrowed resource definition might be helpful in distinguishing between the different HR effects, e.g., define specific skills and knowledge with more detail.

Fifth, the relatively high correlation coefficient of operational performance enforces Ray et al.'s (2004) argumentation that a highly aggregated dependent variable, such as firm performance, may not always be the best way for testing RBT.[555] Since firm performance is based upon the net effect of the different impacts of resources on different performance levels, measuring only an increase or decrease in firm performance may be misleading. The effects on lower performance levels can compensate each other.

Sixth, the moderator analysis of methodological differences confirmed the importance of assessing the strategic value of resources through constructs instead of proxies. The correlation coefficient was almost three times higher for data-types relying on constructs ($\bar{r}$ = 0.151). Interestingly, results on the different journal rankings provided stronger correlations for B- and C-journals than for A-journals. There are several possible reasons for these results. For instance, there are eight (three) times more correlations within the A-journal category, thus, those results are far more robust (see fail-safe N of 3,221 compared to 338 and 41). Also, the review process with A-journals is known to be more thorough than with B- and C-journals, so results from the latter two might be more biased. Nevertheless, these are just speculations that can not be confirmed through further moderator analyses within the respective sub-groups. Similarly, the results on the two different time periods regarding the publication years of the studies were also astonishing. Here, a possible reason might be that with time, there was not only theoretical advancement but also empirical enhancements in terms of best practices. Thus, researchers could gain more in-depth insights on what and how to explore RBT.

Finally, the results of the moderator analysis of content-related differences only revealed one confirmed moderator, i.e., single vs. multiple industries. Surprisingly, multiple industries produced a higher correlation coefficient compared to single industries. Generally, one would expect a reverse effect, since it is most unlikely that all resources are generically strategic for every industry. However, there are two possible explanations in this respect: (1) most of the resources operationalized within the 59 studies seem to be of general strategic importance, such as R&D capabilities, manufacturing capabilities, CEO, or TMT; and (2) testing the impact of resources on performance for a variety of context situations might enhance that, eventually, these resources prove to be strategic within at least one of the multiple industries.

In summary, results from both vote counting and meta-analyses suggest that a significant positive relationship exists between resources and performance. Moreover, each of the six

[555] Cf. Ray et al. (2004), p. 24.

central propositions is being supported. Hence, so far, RBT seems to be empirically corroborated. It is obvious, however, that most of the studies still focus on the rather generic resource-performance relationship without truly integrating and evaluating differentiated resource and factor market conditions. Assessing the rareness, inimitability, and non-substitutability of resources, as well as the information asymmetry and supply inelasticity of factor markets, still seems to pose problems within empirical research. The following chapter will address these problems from a methodological point of view.

5 Methodological Challenges regarding RBT

"Although strategic management has advanced theoretically through the RBV, the methods that complement this theoretical view are less certain and need further development."

Hoskisson, Hitt, Wan, and Yiu (1999), p. 420.

Hoskisson et al. (1999) assert that the research methods applied within empirical tests of RBT in the past, overall, do not seem to be suitable for the task at hand. The authors argue that it is due to the emphasis on the idiosyncratic nature of a firm's resources and capabilities that empirical testing of RBT faces great challenges.[556] As previously outlined in chapter 2.3, the power of RBT in explaining sustainable performance is based upon strategic resources, i.e., on valuable, rare, inimitable, and non-substitutable resources, which are, in part, by their nature unobservable (e.g., tacit knowledge, organizational culture).[557] As a result, empirical testing of these unobservable resources and their effects on firm performance seems to be difficult. "Regarding these challenges, the need for a multiplicity of methods to identify, measure, and understand firm resources is increasing. Empirically we have some understanding of the *what* in many cases but now need to extend our methodology so we can know *how* as well."[558]

Through reviewing the 192 empirical papers, I will describe these methodological problems by looking at how researchers conducted their research, by recognizing which problems did in fact occur, and by outlining which methods researchers chose to overcome these problems. Interestingly, researchers continually assert that empirically testing the RBT poses a challenge, yet, within their own studies, only very few of them actually address these challenges, i.e., properly discuss these problems and evaluate possible resolutions. Even though over 65% of the researchers outlined the studies' limitations, they basically argued theoretical deficits concerning the phenomenon of interest (85%), rather than methodological problems concerning RBT (15%).[559] For instance, Brush and Artz (1999) discussed having problems measuring valuable medical capabilities and had to rely on proxies in the end.[560] Similarly, Combs and Ketchen (1999) outlined having difficulty in measuring reputation as an intangible asset and therefore assessed reputation through an expert panel survey. The authors

[556] Cf. Hoskisson et al. (1999), p. 420; Hitt et al. (1998), p. 13.
[557] Cf. Godfrey/Hill (1995), p. 523; Rouse/Daellenbach (1999), p. 488.
[558] Rouse/Daellenbach (2002), p. 965.
[559] Standard limitations such as the deficits of cross-sectional vs. longitudinal studies (e.g., deficits of missing out on a dynamic perspective vs. generalization problems) were only allotted to the category of discussing resource-based related problems if they emphasized these problems regarding RBT.
[560] Cf. Brush/Artz (1999), p. 229.

asserted that expert opinions provided by relevant academics had been effectively used before as a valid measure of unobservable constructs.[561] Also, King and Zeithaml (2001) stated that in exploring relationships among causal ambiguity, competencies, and firm performance *new* approaches to data collection and analysis were required in order to address the key methodological challenges; the latter being the "…(1) selection of the appropriate industry and organizational samples; (2) identification of a comprehensive range of competencies; (3) development and testing of measures of causal ambiguity; and (4) quantitative and qualitative tests to explore key relationships."[562]

Overall, while arguing methodological problems regarding RBT, these discussions emphasize the one major problem referred to at the beginning of this chapter: the unobservability of one of RBT's central constructs, i.e., strategic resources being partially unobservable. Thus, researchers were challenged to measure ***unobservables***.

In the following, I will address this methodological challenge, concentrating particularly on how to measure unobservables. I will begin by briefly outlining that different resources, as categorized in chapter 2.3.3.1, can be classified by different unobservability degrees, i.e., not all resources are equally unobservable. In order to derive best practices from the review, on how to get to the core of these unobservables, I will then provide information on the research designs (e.g., basic type of study, data collection methods) of the 192 empirical studies, and outline prime examples in this regard. Afterwards, I will evaluate and present further, alternative data collection methods being suitable to assess unobservables. Finally, I will outline best practices on how to conduct empirical RBT research, including a checklist based on the overall results from the review.

5.1 Measuring the Unobservables

In 1995, Godfrey and Hill (1995) already asserted that "…advocates of the resource-based view have yet to solve the empirical problem posed by the inclusion of unobservables in the theory."[563] Today, this is still the main challenge facing empirical RBT researchers. Most strategic resources, such as capabilities, knowledge, or skills, are difficult to assess. These are resources which are tacit, diffused throughout the organization, or socially embedded. And as outlined in chapter 2.3.3.1, these resources are specifically argued to give rise to high barriers

[561] Cf. Combs/Ketchen (1999), p. 876, footnote 4.
[562] King/Zeithaml (2001), p. 79.
[563] Godfrey/Hill (1995), p. 529f.

of imitation. Hence, the hallmark of RBT, in explaining performance persistence over time, is based on the assumption of unobservable resources.[564]

However, resources can possess different unobservability degrees depending on the following characteristics:

- *Intangible* – If resources are intangible, their observability tends to be restricted. For example, the observability of routines, capabilities, and assets such as culture or reputation, is rather limited. Nonetheless, there are also some intangible assets such as patents, contracts, or licenses which are rather observable; these assets may be expressed and codified in blueprints or procedure specifications.[565] Therefore, the characteristic of intangibility is a necessary, but not alone a sufficient criterion. Additionally, a resource must be either causally ambiguous or socially complex to qualify for a high degree of unobservability.
- *Tacit (causal ambiguous)* – If resources are tacit, their observability is impeded. Indicators for tacitness are a lack of *codifiability* and *teachability*, as well as an increased *linkage ambiguity* (i.e., lack of understanding in the chain of cause and effect).[566] Here, especially, knowledge-based resources such as capabilities or HR experience tend to be unobservable.[567]
- *Socially complex* – If resources are socially complex, i.e., if resource linkages increase and/or resources' system dependence increases, their observability is impeded. For example, dynamic routines, such as process innovation, involve several resources within a firm, i.e., the overall observability of this routine might be impeded due to its complexity.

As a result, if resources are both intangible and either causally ambiguous or socially complex, researchers have difficulty in measuring these unobservable resources.

Recently, with regard to these challenges, the call for the use of qualitative methods has grown. For instance, some scholars suggest that qualitative methods, such as multiple case studies, event histories, and ethnographic inquiries, represent appropriate techniques for observing the effects of otherwise unobservable, idiosyncratic effects on business performance.[568] Others suggest methods such as interaction-discussion groups, self-reports, or

[564] Cf. Godfrey/Hill (1995), p. 523; Rouse/Daellenbach (1999), p. 488.
[565] Cf. Fernández et al. (2000), p. 84.
[566] Cf. Barney (1991), p. 108f; King/Zeithaml (2001), p. 77.
[567] "Tacitness refers to the implicit and non-codifiable accumulation of skills that result from learning by doing." Reed/DeFillippi (1990), p. 89.
[568] Cf. Godfrey/Hill (1995), p. 531; Rouse/Daellenbach (1999).

causal maps to identify a firm's resources.[569] Also, some emphasize the importance of academic-practitioner collaboration, or focus on the advantage of inside-organizational work for identifying strategic resources, and to be able to gain 'know-*how*'.[570] In the following, I will assess the suitability of these methods for the purpose at hand. Nevertheless, besides these requests and suggestions, the question of how scholars *did* in fact confront these challenges within their empirical work has not been posed, and will thus be appraised beforehand. In order to obtain prime examples and best practices from the review in this regard, the following section will begin with a brief overview of the research designs of the 192 empirical studies.

5.1.1 Overview of the Review's Research Designs

Regarding the research designs of the empirical articles, Table 5 lists the studies according to the following criteria: basic type of study, time period, data collection methods, data source, sample size, and data analysis methods.

Basic Type of Study*	# of Tests	% of Tests
Survey	158	82%
Case Study	35	17%
Experiment	2	1%
Time-Period	**# of Tests**	**% of Tests**
Cross-Sectional	103	54%
Longitudinal	88	46%
Data Collection Method**	**# of Tests**	**% of Tests**
Interviews	55	19%
Questionnaires	87	30%
Observation	4	1%
Expert Panels	6	2%
Secondary Data	138	48%
Data Source	**# of Tests**	**% of Tests**
Primary	59	31%
Secondary	73	38%
Both	59	31%
Sample Size (N)	**# of Tests**	**% of Tests**
0 – 100	87	45%
101 – 1000	89	47%
> 1000	15	8%

[569] Cf. Balogun et al. (2003); Ambrosini/Bowman (2001).
[570] Cf. Amabile et al. (2001); Rynes et al. (2001); Rouse/Daellenbach (1999, 2002).

Data Analysis Methods**	# of Tests	% of Tests
Traditional	**143**	**72%**
Case Study	28	-
Regression Analysis (RA)	91	-
Specialized* **	**56**	**28%**
Event History	4	-
Logistic Regression Analysis	8	-
Structural Equation Model	13	-
Variance Component	7	-

* Note that 4 articles conducted both case studies and a survey (Henderson & Cockburn, 1994; Peng & York, 2001; Sharma & Vredenburg, 1998; Zander & Kogut, 1995).
** Note that one study can be allotted to more than one category.
*** Other methods used are, for example, conjoint analysis, factor analysis, cluster analysis, coordination games, grouped probit model, matched sample comparison group method, co-plot methods, poisson regression analysis, binominal regression analysis, pooled time series, event-time regression analysis, partial adjustment models, network analysis, path analysis, simultaneous equations, etc.

Table 47: Overview of Empirical Studies on their Research Design

Not surprisingly, the data on the ***basic type of study*** show that almost all studies were conducted as surveys (82%). Nevertheless, the case study also seems to be another suitable way to carry out empirical resource-based research (17%). The enormous merit of a case study is its opportunity to get more detailed information on, and more insights into, the course of events of a focal firm, and hence, on their resources, respectively.[571] Consequently, it appears to be suitable to perform both: first, case studies to acknowledge all important firm-specific resources and capabilities, and second, large sample-sized surveys to provide a sufficient amount of empirical data on the subject. Surprisingly, throughout the review, only four examples could be found: regarding the oil and gas industry, Sharma and Vredenburg (1998) examined the validity of linkages between environmental responsiveness strategies and the emergence of competitively valuable organizational capabilities, by conducting both case studies and a survey. The case studies enabled them to define items, which they later used for their questionnaire to reflect organizational capabilities and the competitive benefit (intended to measure the competitive outcomes of the organizational capabilities).[572] Zander and Kogut (1995) focus on what determines the speed of transfer and imitation of capabilities, by looking at different dimensions of these capabilities, i.e., of the underlying knowledge. Through eight different case studies of innovations in three different Swedish manufacturing firms, the authors were able to identify their items in this regard for their questionnaire.[573] Two further studies relied on case studies from their previous work: Henderson and Cockburn (1994), through using their case studies' detailed data, for a variety of measures of

[571] Cf. Eisenhardt (1989), p. 546.
[572] Cf. Sharma/Vredenburg (1998).
[573] Cf. Zander/Kogut (1995).

competence; as well as Peng and York (2001) through using their case studies' insight information for determining valuable, unique, and hard-to-imitate resources, which will influence export intermediaries' performance, by helping to minimize their clients' transaction and agency costs.[574]

Regarding the ***time period***, as is to be expected, more studies chose the, much less time- and resource-consuming, *cross-sectional design* (54%) instead of a *longitudinal design* (46%). Nevertheless, there are surprisingly nearly as many longitudinal studies as cross-sectional studies, considering the ongoing demand for this design, while at the same time criticizing its practicability. However, most of these longitudinal designs are based on large secondary data bases, which are not sufficient enough for measuring unobservables. RBT emphasizes both the sustainability of performance as well as the idiosyncratic nature of the firm, and thus a longitudinal design based on secondary and primary data collection methods appears to be necessary. It is only through primary data that distinctive and otherwise unobservable resources can be identified.[575]

Regarding the ***data collection methods***, the most frequently used techniques besides *secondary data bases* (48%) were *questionnaires* (30%) and *interviews* (19%). Only very few studies used *observations* (1%) or *expert panels* (2%). As for the ***data source***, 38% of the studies were based on *secondary data*, 31% on *primary* data, whereas 31% used *both* primary and secondary data. Again, following Rouse and Daellenbach's (1999, 2002) criticism on resource-based empirical research, data with full access for everyone, i.e. usually secondary data such as annual reports and press releases, seem less useful.[576] Competitors may analyze them as well, and therefore they cannot be a source for sustainable competitive advantage. Furthermore, secondary data is usually based on observable, 'at hand' measures (e.g., financial statements, organizational numbers, etc.) and is therefore not capable of revealing and adequately measuring unobservables. Acknowledging these criticisms, scholars should at least try to found their research on both primary and secondary data sources.

In addition, Table 5 shows that the ***sample size*** of the studies adds up to 45% for 0-100, 47% for 101-1,000, and 8% exceeding 1,000. Once more, one could be surprised by the extensive data samples, especially regarding the latter category. Naturally, large data samples are favored within surveys; they offer a better chance of significant results. However, when it comes to case studies, sample size does not play such an important role, but rather the degree

[574] Cf. Henderson/Cockburn (1994); Peng/York (2001).
[575] Cf. Rouse/Daellenbach (1999), p. 489.
[576] Cf. Rouse/Daellenbach (1999), p. 488 and (2002), p. 963.

of in-depth insights into the firm in order to expose unobservables. Finally, on the subject of ***data analysis methods***, 72% of the studies used traditional techniques, conducting mostly regression analysis or case studies, whereas 28% used specialized techniques. Here, the most preferred techniques were structure equation models, logistic regression analysis, variance component models, and event history studies.[577]

In summary, the outline of the review results on the research designs showed that, overall, the majority of the research designs were not properly conducted to address the complexity of resource-based constructs. In order to get to the core of (unobservable) resources, case studies should be combined with surveys. Furthermore, longitudinal studies, which should be preferred in order to assess the sustainability of performance impacts, should be conducted using both primary and secondary data. However, some interesting approaches could be detected from the review, focusing on the source of the unobservability challenge: getting access to, and collecting the right data. Those will be addressed in the subsequent section.

5.1.2 Prime Examples from the Review on Measuring Unobservables

The review of the 192 empirical RBT studies provides a few exemplary approaches regarding the measurement of strategic resources in general, and specifically, the attempt to expose rather unobservable constructs.

For instance, Carmeli (2004) evaluates different resource profiles for high and low performing firms. He presents a framework labeled as ***'Strategic Analysis Technique'*** (SAT), which aims to identify the resource profile of a firm:

> SAT tries to enhance the ability of researchers and managers to better understand the core resources (i.e., most valuable, rare, inimitable and non-substitutable) possessed by a particular firm or a group of firms with common characteristics. It consists of four main steps when analyzing the resource profile of a firm. A preliminary task is to identify the potential strategic resources within an industry or populations of industries with common characteristics. Once this in-depth analysis is completed, SAT consists of four main steps and one for re-evaluation. First, it requires selecting the most valuable resources (up to 7) and ranking them for their importance to the success of the firm. In all of the remaining steps, only valuable resources will be examined. Second, the valuable resources will be ranked according to the degree of their rarity. Third, the valuable resources will be ranked according to the extent to which they are inimitable. Fourth, the valuable resources will be ranked according to the extent to which substitutes are not immediately available. Finally, the evaluator is required to look at the original list of resources (created in the preliminary phase) again, and select and score up to seven resources that meet all the four conditions, namely the most valuable, rare, difficult to imitate and non-substitutable. (Carmeli (2004), p. 110f)

[577] The classification of traditional vs. specialized techniques follows Shook et al.'s (2003) classification. Here, only those methods were coded that were directly relevant to testing the study's hypotheses or answering its research questions. If more than one data analysis method was used in a given study, coding was performed for all principal methods used.

Carmeli argues five benefits provided by this framework, i.e., (1) SAT identifies the most valuable resources; (2) SAT takes all four resource conditions into account, thus, the superior resource will be the one that achieves the highest score in the four tests; (3) SAT is more appropriate than the standard original rating because it estimates the interval between resources; (4) SAT exposes the strengths and weaknesses for each resource so that managers can improve the latter, e.g., if a resource is considered to be valuable yet imitable, they can try to enhance imitation barriers; and (5) SAT helps firms gain an insight and understanding about the resources needed to be developed in order to compete in a certain industry.[578]

Another interesting approach is offered by De Oliveira-Wilk and Fensterseifer (2003), who employed ***cognitive mapping analysis*** as a research method, to identify resources shared by a Brazilian wine cluster in its effort to formulate sustainable competitive strategies. At the beginning, the authors conducted several in-depth interviews with experts from the wine sector, in order to identify resources and capabilities of the wine cluster, followed by an elaboration and analysis of cognitive maps, i.e., graphic representations of the collective knowledge of the interviewed experts:

> Cognitive maps can be defined as "graphs" elaborated by a person or a group of persons on the subjective aspects of a problem, which are rendered explicit by the use of induction […]. These maps contribute to the understanding of the images and the words used for the mental representation of a reasoning process and are thus useful in the process of analysing and modelling complex problems characterised by subjective ideas about the reality. (De Oliveira-Wilk and Fensterseifer (2003), p. 1000)

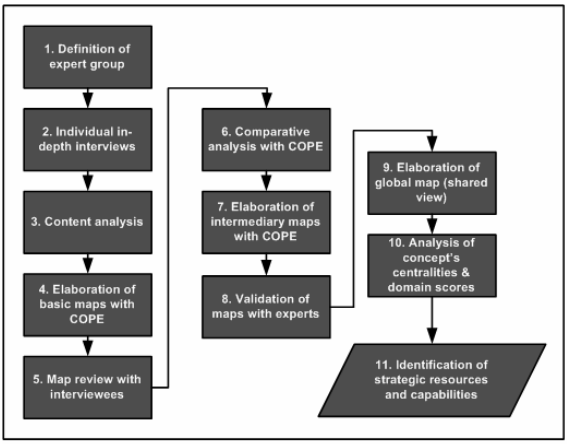


Figure 8: Mapping Process

[578] Cf. Carmeli (2004), p. 116.

In first forming a group of experts – here, regarding the wine industry – De Oliveira-Wilk and Fensterseifer collected data through in-depth semi-structured interviews with this group. The main objective was to characterize a set of resources as a starting point for the identification of strategic resources, whereas the strategic value of the resources was appraised based on four resource conditions. The authors then performed a content analysis through (1) preparing the information, i.e., selecting and highlighting the important aspects pertinent to the research question (e.g., history, learning trajectory, infrastructure, etc.); (2) transforming the general content into concepts, i.e., deriving central ideas, knowledge fragments, and important events; and (3) classifying these concepts into categories, i.e., grouping the concepts by thematic similarity and eliminating duplicates. Next, De Oliveira-Wilk and Fensterseifer elaborated basic cognitive maps which evolved, through several review processes, to intermediary maps and to a global map. The authors outlined the general structure of a cognitive map as follows:

> There are three basic types of concepts in the general structure of a cognitive map:
>
> 1. *tail concepts*, which indicate primary concepts that can represent single ideas, actions, or initial events;
> 2. *branch concepts*, which represent key ideas, actions or events that synthesize the reasoning of the experts and identify convergences between primary concepts and their final effects; and
> 3. *head concepts*, which indicate the final effects. (De Oliveira-Wilk and Fensterseifer (2003), p. 1001)

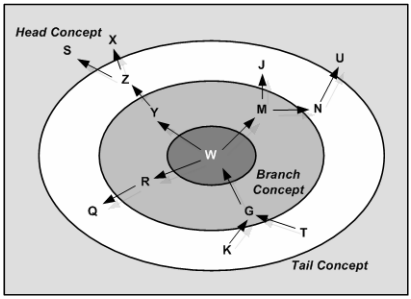


Figure 9: Basic type of concepts of cognitive maps

In steps five to seven, De Oliveira-Wilk and Fensterseifer reviewed these maps individually with each member of the expert group, compared the basic maps generated to identify similarities, and to be able to combine and merge them into so-called intermediary maps. In step eight, these maps were then validated in a series of expert group meetings and merged, in step nine, to a global cognitive map, i.e., a shared view among experts. Finally, in steps ten and eleven, the strategic resources and capabilities were identified through assessing a centrality score for each concept, i.e., a score based on how many concepts are directly or indirectly linked to each other, and thus can considered to be a central concept, which

represents a strategic resource or capability.[579] Their final global cognitive map comprised 170 concepts and they identified several strategic resources and capabilities, as listed in the following table:[580]

Strategic resources and capabilities	Conditions that sustain competitive advantage
Expertise in exploitation of multiple topographies with vineyards	Path dependence, topographical knowledge with long learning curve, non-codified expertise
Tourist attractiveness of mountainous topography, exploitation of mountain wine concept	Immobility, inimitability
Grape varieties adaptation capabilities	Path dependence, long term investments in physical and personnel research structure
Increasing technology incorporation, selective technification of production without losing human touch in wine making	Path dependence, long term investments in technical schools and research institutes
Small family-owned wineries with their own family oenologists	Path dependence, long term investments in technical schools and research institutes, imperfect mobility
Potential for achieving controlled origin, wine authenticity and uniqueness	Complexity, specialization, adaptation, inimitability, immobility
Collective efficiency, 400 wineries	Complexity, co-specialization, path dependence, information asymmetries, imperfect mobility
Long term contracts between wineries and grape-growers	Co-specialization
Distinct climatic characteristics	Specificity, inimitability

Table 48: Strategic Resources and Capabilities within the Wine Industry

Another interesting method is introduced by King and Zeithaml (2003): A ***four-step methodology*** for measuring organizational knowledge from practicing managers' perspectives. To achieve more fine-grained insight about knowledge resources within the textile and hospital industry, the authors suggest the following methodology:

Defining scope – selection of industry and organization, i.e., established industries that have well-defined boundaries:

> Similarities in competitive environment, value chains, and terminology suggest greater consistency in industry context across competing organizations. Established industry boundaries reduce potential confounds that often arise when industry boundaries are fuzzier, or when an industry's competitive dynamics are influenced by diverse configurations of strategic groups […]. This control increases the likelihood that we can identify a relatively comprehensive inventory of knowledge resources, and that managers in the industry could evaluate their perceptions of the resources' importance to their firm's strategic success. (King and Zeithaml (2003), p. 765)

Protocol design – building the researchers' knowledge, i.e., enhance their understanding of the industry specific issues and terminology:

> The next step began with in-depth research, including reviews of the practitioner literature and academic research and interviews with industry experts, to increase our familiarity with industry-specific issues and terminology. This understanding enhanced our credibility and

[579] Cf. De Oliveira-Wilk/Fensterseifer (2003), p. 1001ff. Also, the authors assert that the use of the software COPE, a mapping software, was very helpful. For further information, see De Oliveira-Wilk/Fensterseifer (2003), p. 1003.
[580] Based on De Oliveira-Wilk/Fensterseifer (2003), p. 1007.

> enabled us to ask richer and more probing questions during the structured interviews. To structure the interviews with the chief executives, we developed a protocol that included an overview letter […] and a broad question outline. The protocol was pretested on an executive director of a major university hospital and the CEO and top manager of a large, privately held textile firm. We solicited feedback regarding clarity, overall impressions, and the likelihood of participation by other executives and organizations. (King and Zeithaml (2003), p. 765)

Data collection – interview CEOs to identify organizational knowledge resources:

> To identify an inventory of organizational knowledge resources, we interviewed nine textile and eight hospital CEOs. Prior to each interview, we faxed the overview to the CEO to establish expectations for the meeting and provide initial guidance in scoping the knowledge resources. During each interview, we asked the CEO to identify the 'knowledge or skills that may provide competitive advantage' at their organization and in the industry. The interview involved an iterative process as the CEO talked through the sources of competitive advantage at the firm and worked to articulate organizational knowledge on an appropriate scale, specific enough to clearly relate to ways organizational knowledge can add value in an industry and general enough to allow for reapplication to sustain value in future endeavors. […] Interviews lasted from 50 minutes to 2 hours. […] each interviewer used a line-by-line open coding method to generate a list of the knowledge resources discussed during that interview […]. For each organization, we then compared our lists and our notes for content, tone and accuracy, and, following a discussion, determined a final company-specific list that we sent to the CEO for confirmation. […] Based on these interviews, we identified 36 different knowledge resources in the textile industry, and 30 in the hospital industry. (King and Zeithaml (2003), p. 766)

Data collection – survey managers to measure organizational knowledge resources:

> Members of the top management team and 4-11 middle managers in the same 17 organizations completed surveys appraising the knowledge resources generated through the CEO interviews. The executives who participated in the surveys represented all functional areas. […] For each knowledge resource identified in an industry, each manager rated the extent to which their organization was at an advantage or disadvantage compared to their competition using a 7-point scale […]. We calculated means to measure the perceived value of each organization knowledge resource to an organization. (King and Zeithaml (2003), p. 766f)

The authors assert that this methodology for identifying and measuring managers' perceptions of knowledge resources is more suitable, since knowledge resources are not accessible using quantitative (content-free) approaches, such as patent data or R&D expenditures.[581]

Unfortunately, such examples are still very rare – most researchers did not conduct such comprehensive approaches for obvious reasons, i.e., access difficulties as well as cost- and time-consuming aspects. However, there are a few more suitable methods in this regard that have yet not been applied to RBT research.

5.1.3 Alternative Methods for Measuring Unobservables

Overall, there are two general methodological approaches that can be considered as useful: Rouse and Daellenbach (1999, 2002) suggest that it is ***research in organizations*** that will help to disentangle the key-factors by gaining an in-depth understanding of the organization

[581] Cf. King/Zeithaml (2003), p. 769.

and its processes.[582] They argue that with a higher level of research *in* an organization, the level of researchers' understanding increases and, therefore, the descriptive and analytical data becomes more exact, accurate, and suitable. If researchers don't participate long enough, they miss out on the only possibility to get access to trustworthy data from insiders, as well as the chance to observe tacit factors which cannot otherwise be discovered except by observation. In other words: "Sources of advantage buried in organizational effects can only be uncovered, and an integrated understanding can only be achieved, by doing research actually *in* organizations."[583] Similar to research in organizations, authors such as Amabile et al. (2001) address the value of ***academic-practitioner collaboration***: "…management research will be substantially strengthened by effective collaboration between researchers and practicing managers."[584] This kind of collaboration guarantees a certain amount of quality, since (a) the research questions will be framed in a way that will be meaningful to practitioners from the beginning; (b) there is an access to sites for field research, as well as other appropriate data collection instruments and methods; and (c) results can be interpreted within the business context.[585] However, these collaborations still seem to be very rare. For example, Amabile et al. (2001) discovered that between January 1994 and June 1999 only 4 % of the articles published in the AMJ and less than 1 % of the articles published in ASQ listed academics and practitioners as coauthors.[586] Regarding the present review, overall, only 3 % of the articles were coauthored by practitioners.[587]

Now, regarding these general methodological approaches, there are a number of methods that increasingly focus on insight organizational research, as well as attach more importance to academic-practitioner collaborations. Through conducting an extensive literature review as well as five interviews with methodological experts in the fields of economics, psychology,

[582] Cf. Rouse/Daellenbach (1999), p. 489f. See also Rynes et al. (1999), p. 871f for merits and disadvantages of academic research inside organizations. In their empirical assessment of academic research inside organizations, the authors concluded that spending time at the research site enhanced scientific impact and also the prospects for research implementation. Cf. Rynes et al. (1999), p. 895.

[583] Rouse/Daellenbach (1999), p. 490. See also Ambrosini/Bowman (2001), p. 823f; Balogun et al. (2003), p. 201. Following Barney and Mackey (2005), many studies "examine the value potential of a firm's resources at a level of analysis below that of the firm. Not surprisingly, the most correct level of analysis at which to examine the relationship between a firm's resources and its strategies is at the level of the resource, not the level of the firm. However, the firm is usually the unit of accrual. We are likely to learn a great deal more about the relationship between resources and strategies if scholars are able to "get inside" the firm, where resources reside, rather than simply correlate aggregate measures of resources with aggregate measures of the value of a firm's strategies (Rouse & Daellenbach, 1999)." Barney/Mackey (2005), p. 5.

[584] Amabile et al. (2001), p. 418.

[585] Cf. Amabile et al. (2001), p. 418. See also Rynes/McNatt (2001).

[586] Cf. Amabile et al. (2001), p. 419.

[587] E.g., McWilliams et al. (2002); Mauri/Michaels (1998); Borch et al. (1999); Boxall/Steeneveld (1999).

and sociology,[588] I was able to identify several methods that seemed to be suitable in this connection:[589]

(1) Interviewing Techniques

Interviewing techniques are still some of the most suitable methods for the purpose at hand, i.e., getting 'insight' information. These techniques include for example: (1) ***Expert interviews***, which are especially useful, since researchers are able to get exclusive insights into structures and processes from the perspective of a certain (group of) individual(s). Its narrative character provides the researcher with context-specific, personal insider know-how that informs about collective orientations and functional know-how, and reveals implicit procedures.[590] (2) ***Narrative interviews***, which help researchers to understand the respondent's underlying strategies and constraints.[591] Useful in this connection is the so-called *story-telling approach*, i.e., letting participants tell stories as a form of implicit communication, and since they are contextually embedded, they reflect the social complexity within which work takes place.[592] Thus, the method provides in-depth, personal information that bears the potential to reveal tacit structures, social complexity, and cause-and-effect chains. (3) ***Critical incident techniques***, which also allow researchers to gain in-depth, personal data reflecting the individual's perspective on a specific occurrence. Here, respondents are asked to recall causes, events, consequences, and/ or responsibilities, in order to relate those incidents to decisive subsequent occurrences.[593] In consequence, this approach reveals underlying chains of cause and effect, as well as path dependencies. (4) ***Diaries***, which are most appropriate, if the researcher wants to track events through time from the perspective of a person involved, or to repeatedly collect data on a certain activity, thereby allowing for a detailed view of organizations, relationships, and events from an insider perspective.[594] Yet, diaries require the participants' willingness to document their daily work routine and special occurrences they encountered, as well as their feelings, impressions, etc.[595] However, in combining individual diaries with rather objective diary types, such as annual

[588] The interviews are listed in the appendix.
[589] The following list offers applicable examples; however, it is not exhaustive.
[590] Cf. Liebold/Trinczek (2002), p. 37f and p. 58.
[591] Cf. Schütze (1983); Holtgrewe (2002), p. 72f; Hermanns (1991), p. 184f.
[592] Cf. Ambrosini/Bowman (2001), p. 820; Martin (1982), p. 257. Usually, participants are asked to tell two stories regarding what has in the past caused organizational success vs. failure. Conducting the interview within the participants' organization and its familiar surroundings can serve as cues. Cf. Ambrosini/Bowman (2001), p. 820f; Balogun et al. (2003), p. 205.
[593] Cf. Cook (2004), p. 27; Flanagan (1954), p. 327ff.
[594] Cf. Balogun et al. (2003), p. 208; Breakwell/Wood (1995), p. 293f.
[595] Cf. Easterby-Smith et al. (2002), p. 114f.

reports, researchers are able to gain a comprehensive insight and understanding.[596] (5) ***Repertory grid techniques***, originating from the personal construct theory of George Kelly (1955), who believed that individuals are permanently creating cognitive maps to organize their experiences,[597] help researchers to uncover these maps. Thus, in using these techniques, implicit content and structures can be revealed, as well as hidden know-how and personal work-related relationships. (6) ***Self-Q interviews***, i.e., self-interviewing techniques, which help researchers to enhance their data quality. The assumption made here is that respondents are the experts on their personal knowledge and thus, if they develop questions sourcing from their own know-how, these are likely to reveal more insights and provide better results.[598] (7) ***Cognitive maps***, as outlined within the prime examples from the review, are another interesting approach to reveal the chain of cause and effect by placing concepts in relation to one another, and imposing structure on vague situations. They help in ordering and analyzing things that are difficult to assess, as well as eliciting context dependent factors.[599] Ambrosini and Bowman (2001) in fact recommend causal maps as the most suitable method for understanding and assessing tacit knowledge.[600] (8) ***Group discussions (focus groups)***, which help to uncover tacit know-how of organizational members as well as their interactions within an organization. Thus, those discussions offer two types of information – information on group processes, i.e., how people interact and communicate, as well as information about the processes' content, i.e., interaction effects on beliefs, attitudes, opinions, and feelings, so that individual and social aspects may be looked at simultaneously.[601] (9) ***Panel designs***, i.e., a certain sample group is repeatedly questioned about the same issue, which allow researchers to compare the results of the different points in time and, hence, uncover changes in opinion, behavior, status, or other attributes relevant to the context.[602] In general, panels allow singling

[596] Cf. Breakwell/Wood (1995), p. 294.
[597] Cf. Kelly (1955); Easterby-Smith et al. (2002), p. 97; Reger (1990), p. 302; Fransella/Bannister (1997).
[598] Cf. Bougon et al. (1989), p. 328; Ambrosini/Bowman (2001), p. 819. Through self-interviewing techniques "…the events, objects, and concepts [the participants] use to express their questions … reveal their tacit and explicit knowledge" Bougon et al. (1989), p. 329.
[599] See chapter 5.1.2 as well as Ambrosini/Bowman (2001), p. 817; Huff (1990), p. 15f; Gnyawali/Tyler (2005), p. 225ff. "Research instruments such as surveys and structured interviews are likely to be inappropriate insofar as individuals cannot be asked to state what they cannot readily articulate. The main challenge that may have to be faced is finding ways of expressing what is, or more correctly what has not been up to now, expressible." Abrosini/Bowman (2001), p. 815.
[600] "The causal mapping method […] is an indirect way of surfacing tacit skills. It will be fragmented, not comprehensive, partial and biased but it should provide some insights to both participants and researchers into tacit skills and organizational success." Ambrosini/Bowman (2001), p. 825.
[601] Cf. Millward (1995), p. 276; Liebig/Nentwig-Gesemann (2002), p. 145. See Steyaert/Bouwen (1994), p. 142ff for a comparison, benefits, and limitations of different types of group discussion methods.
[602] Cf. Erbslöh, p. 36; Mayntz et al. (1971), p. 134; Greve/Goldeng (2004), p. 137.

out effects of stable firm characteristics, specific firm actions, time-period characteristics, and decaying (temporary) effects of firm or environmental states.[603]

(2) Observational Approaches

Observational approaches are a common research method for the purpose of getting 'insight' information and are usually differentiated into different levels of participations. Through participant observation, researchers and informants interact in the informants' actual social surroundings.[604] Thus, researchers may gain first hand impressions of how the informants behave in particular everyday situations, and deepen their understanding by asking the informants about their feelings and interpretations. Observations are useful if researchers want to get insight information regarding social interactions, especially if those are generally obscured from public view. Observations might also be helpful in revealing and interpreting controversial context situations, e.g., employees with diverse points of view on a specific topic.[605] Through gaining access to rather private events, researchers have the possibility to gather in-depth and very personal data, observe chains of cause and effect, and even participate to get an authentic insight.[606]

(3) Analytical Approaches

There are several analytical approaches that are useful in structuring and interpreting large amounts of data, such as the data that researchers generate with interviewing techniques and observational approaches: (1) ***Content analysis***, used to systematically structuring large data amounts, is a suitable categorization and interpretation approach and can be applied to each of the interviewing techniques and observational approaches, as well as to secondary data such as annual reports, media statements, email conversations, etc.[607] (2) ***Grounded theory approach***, used to derive theories directly from the concepts and categories of the

[603] Cf. Greve/Goldeng (2004), p. 136. For instance, Bergmann-Lichtenstein and Brush (2001) use a panel design in their study on how resource bundles develop and change over time in new ventures.
[604] There are two variations of participant observation. The first, called co-research, draws on the complementary perspectives, interests, skills, and knowledge of an academic (outsider view), a host manager from within the firm (insider), and a co-researcher from a different organization (insider in type of organization, outsider in the sense that his/her own company is composed differently). Cf. Hartley/Benington (2000). The second, termed action research, describes a research approach of organizational intervention that attempts to result in practical transformation and advanced knowledge. Cf. Huxham/Vangen (2003), p. 384.
[605] Cf. Waddington (1994), p. 108. Also, participant observation methods can easily be combined using interviewing techniques for getting more information. Cf. Bachman (2002), p. 335.
[606] Data gathered through observations generally include detailed descriptions of people, events, and conversations as well as the observer's actions, feelings and hypotheses. Cf. Waddington (1994), p.109f.
[607] Cf. Millward (1995), p. 288. See Mayring (1991), p. 210ff for respective procedures. Regarding RBT, Deephouse (2000), for instance, used content analysis of newspaper articles to measure the media reputation of commercial banks. His results indicate that media reputation, an intangible resource, is a resource influencing performance.

respondents,[608] is also appropriate for categorizing and interpreting complex data, while aiming to conclude on theoretical propositions in this regard. (3) ***Network analysis***, used to map the components of and their relationships within an organization as well as to discern causes and consequences,[609] is also an appropriate technique for categorizing and interpreting complex data, while revealing and concluding on complex network structures in terms of cause-and-effect chains.

5.2 Checklist for Empirical RBT Research

The following chapter is now going to conclude on the results from the previous chapters 3 and 4 in order to derive general guidelines and best practices, as well as a checklist for future empirical research.

5.2.1 General Guidelines and Best Practices

As a first suggestion, the review in chapter 3 showed that researchers should pay more attention to their ***RBT-related definitions***. The specification of the *resource-conduct-performance relationship* seems to be helpful in this regard, and it is suggested that researchers should concentrate on their categorizations of relevant constructs and contexts. Here, I would like to suggest using *attribute-based* and *circumstance-based categorizations*.[610] Whereas the first focuses on attributes of the constructs (e.g., different resource types), the latter contemplates with various context situations. As outlined in chapter 2.3.3.1, resources can be categorized according to the framework presented in Figure 2 and supplemented with additional attributes.[611] Specifically, researchers should provide with an adequate resource definition, including whether they refer to a unique resource or a resource-bundle. Regarding the circumstances, there are three different higher categories which should cover the most important context factors: industry, environment, and conduct. Whereas categorization suggestions for the first two were discussed in chapter 3.2, the latter, in general, stands for the variety of different strategic behaviors practitioners can display and,

[608] Cf. Easterby-Smith et al. (2002), p. 122; Wiedemann (1991), p. 442ff.
[609] Cf. Tichy et al. (1980), p. 372. According to von Kardorff (1991), a qualitative approach to network analysis is advisable, i.e., case studies of rather small groups using methods, such as participant observation, interviews, diaries, or group discussion. Cf. von Kardorff (1991), p. 404. See Zwijze-Koning/De Jong (2005) for further details on underlying data collection techniques.
[610] Cf. Christensen et al. (2002), p. 10.
[611] An interesting approach of categorizing and attributing resources can be found within Jolly's (2000) contribution. The author develops a continuum of attribute-pairs such as 'tangible – intangible', 'marketable – unmarketable', 'discrete – systemic', etc. and aligns resources on a scale between these continuums. Cf. Jolly (2000), p. 786. Here, attributes not yet refer to the four resource conditions.

thus, comprises an accumulation of strategic management choices, e.g., cost vs. quality leadership, different diversification decisions, type of production systems, etc.

Second, to ensure both a theoretical and empirical assessment of the phenomenon of interest, a ***two-step process*** is suggested: First of all, researchers should *identify potential resources* and then *analyze them theoretically* in terms of the four resource conditions, i.e., are these resources considered to be valuable, rare, inimitable, and non-substitutable. Second, researchers should *measure the proposed resources* and show that they have a positive effect on firm performance.[612]

Third, to enhance objectiveness about the resource-performance-relationship, a ***comparative approach*** is suggested, including high and low performers. Looking only at one group might distort the results due to subjective assessments of "value" and "good performance". Thus, due to the relative character of performance and value, while using a comparative approach, results can be accounted as more objective.[613] In this connection, Rouse and Daellenbach (1999) suggest the following *framework*: "The framework begins with a four-step firm selection process. The first step involves the selection of an industry and generating performance data and rankings from secondary sources (importance of industry). The second step is to cluster firms by strategic type or group within the industry selected. The third step in firm selection is to compare performance indices within strategic groups. The final step in the selection process is to identify those firms within each strategic group that are the high and low performers."[614] A good example from the review in this connection is Carmeli (2004), who, as described above, evaluated resource profiles for firms and compared these between high and low performers. The author identified twelve firms as growing firms (successful in terms of annual growth) and the others as slow-growing (less-successful) firms, drawing the line between these two groups at 15 per cent annual growth in US dollars.[615]

5.2.2 Best Practices for Research Designs of RBT Studies

"The very nature of strategic resources suggests that large sample, multi-industry, single time-period samples using secondary sources of data will not help disentangle the key factors that may provide sustainable advantage."[616] Taking up Rouse and Daellenbach's (1999) critics on

[612] Cf. Deephouse (2000), p. 1092. See chapter 3.2.1 for prime examples in this connection.
[613] Cf. Peteraf/Barney (2003), p. 320. For instance, Peteraf and Barney assert that competitive advantage is per definition a relative term and therefore requires an exogenous basis for comparison; rents as well.
[614] Rouse/Daellenbach (1999), p. 489.
[615] Cf. Carmeli (2004), p. 113. For further examples, see Fahy (2002), O'Regan/Ghobadian (2004), and Santhanam/Hartono (2003).
[616] Rouse/Daellenbach (1999), p. 487.

empirical research designs, I will now provide guidelines regarding the research designs of RBT studies.

In deciding on the ***basic type of study***, it is, suitable to rely on hybrid designs, i.e., perform case studies as well as surveys, in order to combine both advantages of these designs. Obviously, this combination seems to be suitable for almost every strategic management research. Even in 1983, i.e., before the birth of the RBT, Harrigan already argued in favor of hybrid designs within her article on research methodologies for contingency approaches to business strategy: "Because the hypotheses tested in a contingency approach to strategy are complex, and because the relationships among industry structure, competitive conduct, and firms' performance are dynamic, researchers who have relied on either single site case studies or large database methodologies are missing important aspects of the construct they studied."[617] Currently, this recommendation particularly applies to resource-based empirical research for it is especially helpful regarding the unobservability problem of RBT constructs. In other words, to perform case studies at the beginning helps to get to the core of these constructs and, thus, helps to acknowledge all important firm-specific resources and capabilities of particular industries, even though they might not be observable.[618] Afterwards, a large sample-sized survey will then provide a sufficient amount of empirical data on the subject.

In deciding on the ***time period***, several aspects speak in favor of conducting longitudinal research designs. Again, generally speaking, this recommendation applies for almost every strategic management research, since research methods focusing on firm histories will always provide greater insights into the antecedents of the proposed (theoretical) relationship.[619] However, it is particularly important in RBT research for the following reasons. First of all, sustainability is the key to RBT and, therefore, researchers should confirm that resources are longitudinally predictive of superior performance.[620] Second, some dimensions of inimitability can only be assessed through a longitudinal design, i.e., path dependencies as well as time compressions. Third, a longitudinal design might even render unnecessary the operationalization of some of the resource conditions. If, for example, superior performance is empirically demonstrated to last over an adequate period of time, couldn't one implicitly conclude that certain resources are "rare", "inimitable", and "non-substitutable"? In other words, it is even conceivable to argue that a lack of resources, a lack of imitations, as well as

[617] Harrigan (1983), p. 400.
[618] See Eisenhardt (1989) on further guidelines on how to conduct case studies.
[619] Cf. Harrigan (1983), p. 403.
[620] Cf. Levitas/Chi (2002), p. 961.

a lack of substitutes through time equates with these characteristics, i.e., confirm a resource's rareness, inimitability, and non-substitutability.[621]

In deciding on the ***data source***, results emphasized the importance of primary data with additional secondary data sources for (cross-) validation and completion.[622] Furthermore, scholars endorse using both *insider* and *outsider information* since validity increases.[623] Outsider informants are understood as individuals not employed in the firm being studied, e.g., consultants, academics, analysts, and industry stakeholders in general; they can be used for exploration, confirmation as well as measurement purposes regarding the phenomenon of interest.[624] Whereas insider information is, as previously discussed, without doubt the most important source to get to the core of resource-based constructs within a firm, there is also a necessity for additional information provided by outsiders to obtain rather objective, unbiased data, e.g., data on the firm itself, its performance as well as its industry and environment characteristics. The latter is recommended on the grounds that outsiders can look at the firm without any emotional attachment to it, hence, no risk of delivering biased information due to being blind sighted. Also, if used as experts, they might enhance the understanding of the firm's context. Harrigan (1983), for example, suggests conducting interviews with outside informants for a better understanding of firms, their environment, and their strategies.[625] Finally, some information might be restricted by confidentiality even with a firm's cooperation and thus the use of informed practitioners and observers, i.e., outsiders, are the way to work around this.[626] Yet, while incorporating outsider information, several measurement issues have to be acknowledged, i.e., the assessment of interrater reliability whenever using multiple respondents, the cross-validation of the measures with other information sources, and the assessment of the accuracy of informant opinions relative to insiders.[627] For example, Chen et al. (1993) empirically explore the expertness of using outside informants in general. The authors systematically investigate how various types of

[621] See Miller and Friesen (1982) for advantages and limitations of longitudinal research in general and on five different research types in particular, classified according to three dimensions: breadth of focus, sample size, and the extent to which quantification occurs. Cf. Miller/Friesen (1982), p. 1013ff.
[622] "This, of course, implies that the best resource-based empirical work will involve collecting primary data from within firms in a carefully drawn sample." Barney/Mackey (2005), p. 5.
[623] Cf. Chen et al. (1993), p. 1614ff; Harrigan (1983), p. 398; March/Sutton (1997), p. 701; Ambrosini/Bowman (2001), p. 824f; Balogun et al. (2003), p. 217. Studies from the present review using outsider information are for example Douglas/Ryman (2003), Christiaanse/Venkatraman (2002), Combs/Ketchen (1999), and King/Zeithaml (2001).
[624] Cf. Chen et al. (1993), p. 1615.
[625] Cf. Harrigan (1983), p. 401.
[626] Cf. Chen et al. (1993), p. 1615.
[627] Cf. Chen et al. (1993), p. 1618. For further details see Chen et al. (1993), Shrout/Fleiss (1979), Snow/Hambrick (1980), and Venkatraman/Grant (1986).

outside informants have been used in strategy research, and assess the reliability and validity of their judgments through performing a meta-analysis, as well as conducting an own empirical study within the airline industry. As a result, the authors could show that all outside informants were significantly reliable. Furthermore, regarding validity, Chen et al. (1993) proved analysts to be the most accurate of the groups, followed by consultants, academics, and stakeholders. However, the results also revealed that the use of outside informants as a substitute for insiders' judgments should be restricted to evaluate issues that are rather visible and uniform across companies.[628]

In deciding on the ***data collection methods***, chapter 5.1.3 outlined several suitable methods to measure strategic resources and to address the unobservability problem of constructs, i.e., the collection of relevant, yet, mostly unobservable data, for operationalizing these constructs. These are, for instance, expert and narrative interviews as well as interviews focusing on critical incidents, self-Q interviews, diaries, repertory grid techniques, cognitive mapping techniques, and group discussions (focus groups), as well as observational approaches and analytic methods, such as content analysis, grounded theory approach, or network analysis. Furthermore, there are some general guidelines researchers should acknowledge while collecting their data:

(1) Methods should provide with *idiosyncratic*, *individual*, and *specific information* on the hypothesized constructs in particular, and on the organization and its environment in general (necessity of using primary data and insider information);

(2) *uncover the chain of cause and effect* for the hypothesized context in particular, as well as relevant contexts in general (necessity of relying on insider information, especially on executive participation); and

(3) supply rather *objective, unbiased data* on the organization's performance, as well as its industry and environment characteristics (necessity of also using outside information and secondary data bases).

These guidelines aim at providing both individual primary data to get to the core of the phenomenon, as well as objective secondary data for completion and ensuring validity and reliability. Thus, the use of several data sources and measures also facilitates cross-checks to assure data accuracy.[629]

[628] Cf. Chen et al. (1993), p. 1623ff.
[629] Cf. Harrigan (1983), p. 400.

Regarding the ***data analysis methods***, the choices researchers can make are of course manifold. In this regard, Shook et al. (2003) assert that besides all possible solutions, it is especially important to provide and assure appropriate training in data analysis.[630] Their survey of doctoral graduates showed that many were merely trained in linear models, yet not in the use of specialized techniques, including those suitable for longitudinal data, discrete events and context integration, as well as causal structures necessary for RBT research. In this respect, the following methods can be considered suitable for these purposes:[631]

(1) Longitudinal data

Methods that capture dynamic approaches, and are thus suitable to assess the sustainability of the proposed resource-performance relationship are, for example: (1) *partial adjustment models*, which are especially useful for studying the evolution of performance, since these models are explicitly dynamic (e.g., its parameters can be estimated without assuming that the process under study is in steady-state equilibrium, and they are comparable across studies, even when estimated using different data sets for different time intervals);[632] (2) *equilibrium analysis / time series approaches*, i.e., through either describing an economic system's equilibrium and then comparing that equilibrium to a system's actual state, researchers can predict change over time, or through studying system dynamics by comparing the state of a system at one time with the state of that system at a later time;[633] and (3) *data envelopment analysis* (DEA), which is commonly used to evaluate the efficiency of a number of producers (referred to as decision making units), might be suitable for a dynamic resource utilization analysis.[634]

(2) Discrete events

Methods that are suitable for integrating and evaluating specific context situations on the impact of the proposed resource-performance relationship are for instance: (1) *event history studies*, which provide data that inform about the history of the process under study[635] and

[630] Cf. Shook et al. (2003), p. 1231. Shook et al. (2003) used data from 77 strategic management researchers who attended the Academy of Management's Business Policy and Strategy Division Doctoral Consortium between 1996 and 2001, which is for Ph.D. students having defended their dissertation proposals and also being nominated by their institution as its best eligible student. Cf. Shook et al. (2003), p. 1233.
[631] The following list offers applicable examples; however, it is not exhaustive.
[632] Cf. Barnett et al. (1994), p. 15ff. See also Jordá (1999) for details on random-time aggregation in partial adjustment models.
[633] Cf. Barney (2001), p. 51f.
[634] Cf. Majumdar (1998), p. 822.
[635] I.e., history event study data not only capture states of a process at pre-determined survey points (such as panel data) but also provide data that inform about the course of events between the survey points.

analyze events, i.e., a transition from one discrete state to another;[636] (2) *event studies*, which were developed to measure the effect of an unanticipated event on stock prices, and thus offer the possibility to assess change;[637] and (3) *co-plot methods*, which (similar to strategic group theory) attribute sources of performance differences to a commonality of attributes, and thus might be useful for identifying industry settings to establish specific resource-context-relationships.[638]

(3) Causal structures

Methods that enable researchers to get to the core of strategic resources and uncover the chain of cause and effect are for example: (1) *structural equation models*, which are so-called second-generation multivariate techniques that are increasingly being used to estimate causal models with multiple independent and dependent constructs (these techniques allow the researcher to analyze all paths between constructs simultaneously, rather than through a series of discrete regression models);[639] (2) *causal mapping procedures,* such as the ones outlined in chapter 5.1.2; and (3) *network analyses*, as discussed in chapter 5.1.3.

5.2.3 Summary Checklist

What the review clearly revealed and following Hoopes et al.'s (2003) assertion in the SMJ's special issue on the RBT: "Though large in numbers, empirical research on the RBT has not evolved in a similar accretive way. […there is a] need for a systematic falsification."[640] The following Table 49 to Table 51 will summarize the aspects discussed above and will, as such, serve as a checklist to systematize future research on the RBT and to facilitate an aggregation of research results.

[636] Cf. Weller (2004), p. 520. Accordingly, event history studies are also suitable methods for assessing causal structures using longitudinal data.
[637] Cf. McWilliams/Siegel (1997), p. 628; McWilliams/McWilliams (2000), p. 1.
[638] Cf. Segev et al. (1999).
[639] Examples of SEMs are LISREL and PLS (partial least squares). Compared to LISREL, PLS has some additional advantages: (a) it makes no assumptions about multivariate normality on the data; and (b) it is also suitable for relatively small samples. Therefore, PLS is preferred to LISREL, especially at the beginning of theory building, and when the primary concern is the prediction of the dependent variable. Cf. Birkinshaw et al. (1998), p. 230; Delios/Beamish (1999), p. 717; Cortina et al. (2001), p. 325.
[640] Hoopes et al. (2003), p. 889.

FIRST CONSIDERATIONS FOR EMPIRICAL RBT STUDIES			
ASPECTS	**SPECIFICS**	**APPROACHES**	**REPRESENTATIVE STUDIES**
RBT-related Definitions	Detailed description of RBT-related definitions, i.e., the resource-conduct-performance relationship.	Use the following categorizations: ▪ attribute-based categorization for resources, i.e., according to different resource-types with additional attributes, e.g., discrete vs. systemic, marketable vs. non-marketable ▪ circumstance-based categorization for context situations, i.e., according to different industry and environment variables	Miller & Shamsie (1996); Coff (1999)
Two-Step Process	Assess the phenomenon of interest both theoretically (i.e., argumentatively) and empirically.	▪ Address all four resource conditions argumentatively, i.e., the value, rareness, inimitability, and non-substitutability of resources within a specific context. ▪ Measure the impact of these resources on performance.	Deephouse (2000); Daily, Certo, & Dalton (2000)
Comparative Approach	Include both high and low performers within the research sample to enhance the objectivity of results.	Use the following framework: ▪ selection of an industry and generating performance data and rankings from secondary sources ▪ cluster firms by strategic type or group within the industry selected ▪ compare performance indices within strategic groups ▪ identify those firms within each strategic group that are the high and low performers	Carmeli (2004); Fahy (2002)

Table 49: Checklist I – First Considerations for Empirical RBT Studies

RESEARCH DESIGN ASPECTS OF RBT STUDIES			
ASPECTS	**SPECIFICS**	**APPROACHES**	**REPRESENTATIVE STUDIES**
Basic type of study	Conduct hybrid designs, i.e., both case studies and surveys.	▪ gain in-depth insight into the firm through case studies ▪ use insights from case study for the subsequent survey	Sharma & Vredenburg (1998); Zander & Kogut (1995)
Time period	Conduct longitudinal research designs to acknowledge: (1) sustainability aspects (2) path dependencies and time compression advantages (3) resource conditions over time	Rely on longitudinal data approaches, such as panel designs and event history data.	Barnett, Greve, & Park (1994); Gimeno (1999)
Data Source	Use both: (1) primary and secondary data (2) insider and outsider information (3) different sources for dependent and independent variables	Rely on: (1) primary data collection techniques as well as additional secondary data bases such as COMPUSTAT (2) outsider information such as consultants, academics, analysts, and industry stakeholders in general	Christiaanse & Venkatraman (2002); Combs & Ketchen (1999); McEvily & Chakravarthy (2002)
Data collection methods	Use methods that provide: (1) in-depth insights into a firm's resources and capabilities (2) insights into the chain of cause and effect (3) and data that is objective, longitudinal, facilitates comparison across sites, and is collectable at multiple organizational levels	Such methods are for example: ▪ interview techniques – expert and narrative interviews as well as interviews focusing on critical incidents, self-Q interviews, diaries, repertory grid techniques, cognitive mapping techniques, and group discussions (focus groups); ▪ observation approaches – participant vs. observant ▪ analytic approaches – content analysis, grounded theory approach, network analysis	Carmeli (2004); De Oliveira-Wilk & Fensterseifer (2003); King & Zeithaml (2003)
Data analysis methods	Use methods that are suitable for handling: (1) longitudinal data (2) discrete events (3) causal structures	Such methods are for example: (1) partial adjustment models, equilibrium analysis and time series approaches, and data envelopment analysis; (2) event history studies, event studies, and co-plot methods; (3) structural equation models, causal mapping procedures, and network analyses	Gimeno (1999); Park, Mezias, & Song (2004); Rao (1994); McEvily & Zaheer (1999)

Table 50: Checklist II – Research Design Aspects of RBT Studies

RESEARCH CONSTRUCTS OF RBT STUDIES			
CONSTRUCTS	**SPECIFICS**	**APPROACHES**	**REPRESENTATIVE STUDIES**
Dependent Variable	While operationalizing (sustainable) rents, the following specifics should be acknowledged: (1) minding the construct levels (2) concede the construct's complexity (3) enlarge the construct space (4) enhance measurement quality (5) assess the data convergence	To acknowledge these specifics, the following approaches might be helpful: (1) use both firm-level and lower-level performance, i.e., derive several performance levels through analyzing the chain of cause and effect in order to detect and outline the overall net effect; (2) control for feedback loops through including past, present, and future performance measures; check for retrospective bias by incorporating matching control variables; (3) avoid single dimension operationalization approaches and rather operationalize several aspects of performance simultaneously, i.e., financial performance (accounting-based measures such as ROA, ROS, or market-to-book value) and business performance (market-based measures such as market share, sales growth) as well as organizational effectiveness (stakeholder-based measures such as employee satisfaction, quality, and social responsibility); (4) provide scope for assessing convergent validity by using data from both primary and secondary sources; (5) examine convergence between data from alternate sources (i.e., if both primary and secondary data sources are used, check if the different measures derived from these sources are correlated and also proportional to each other); if convergence is not given, examine the level of measurement error in the different operationalizations	(1) Ray, Barney, & Muhanna (2004); (2) Barnett, Greve, & Park (1994); (3) Daily, Certo, & Dalton (2000); (4) and (5) McGrath, MacMillan, & Venkataraman (1995); Bennett, Ketchen, & Schultz (1998)
Independent Variables	While operationalizing strategic resources, assess all four resource conditions.	Assess the four resource conditions argumentatively and rely on the items and guidelines presented in Table 14 to Table 16 for scale development and statistical measurement.	Maijoor & Witteloostuijn (1996); Kogut & Zander (1993); Markman, Espina, & Phan (2004)

RESEARCH CONSTRUCTS OF RBT STUDIES			
CONSTRUCTS	**SPECIFICS**	**APPROACHES**	**REPRESENTATIVE STUDIES**
Context Variables	While operationalizing context variables, i.e., integrating context within RBT studies, the following specifics should be acknowledged: (1) select industry(s) (2) identify definable strategic time period(s) (3) assess industry and environmental variables	To acknowledge these specifics, the following approaches might be helpful: (1) rely on NAICS and SIC codes (NACE for Europe) or the use of methods, e.g., strategic group method, co-plot method (2) look at turning points and significant changes within an industry and its environment; compare covariance matrices from year to year to determine if significant changes are present between groups of years; (3) assess context variables through secondary data bases, expert interviews, questionnaires, etc. (see categorization of variables in Table 23)	(1) Segev, Raveh, & Farjoun (1999); Youndt, Snell, Dean, & Lepak (1996); (2) Geringer, Tallman, & Olsen (2000); (3) Brews & Hunt (1999)

Table 51: Checklist III – Research Constructs of RBT Studies

6 Conclusion and Future Research Agenda

"Like all philosophical debates, ultimate resolution is impossible and one's position is arrived at by weighing the arguments."

Godfrey and Hill (1995), p. 523.

The introductory chapter of this dissertation outlined the continuously heated debate of whether RBT can in fact be considered a theory, with critics basically questioning the empirical testability of RBT. Throughout this dissertation, it became obvious that RBT is – and has been – empirically testable. To make this argument, I addressed and cleared each of the three main research deficits of RBT in this respect: (1) the lack of understanding towards RBT's central empirically testable propositions; (2) the lack of understanding towards the empirical validation of RBT, i.e., no thorough efforts towards the accumulation and integration of research findings; and (3) the lack of systematically addressing the methodological problems, and evaluating a broader basis of more suitable methods. In the following, I will conclude on the main findings, while also outlining implications for RBT. In addition, I will discuss the dissertation's limitations as well as provide a future research agenda for resource-based research, both theoretically and empirically.

6.1 Conclusions and Implications

The analyses throughout this dissertation – the theoretical analysis within chapter 2, the narrative review within chapter 3, as well as the vote counting and the meta-analysis within chapter 4 – all emphasized that it seems justified to ***refer to the resource-based perspective as a theory***. We have complete information on the theory's historical development and assumptions, a comprehensive description of its constructs and their interconnectedness (including the assessment that these constructs are not defined in a way in which they could be considered tautological), a representational framework (Figure 3), as well as six central propositions, and multiple empirical tests that endorsed the theory.

One of the main conclusions drawn from the analysis within chapter 2 was the exposure of the ***six central propositions of RBT***. By systematically analyzing the main theoretical papers and combining the different arguments on the central constructs of the theory, i.e., on resource, performance, and market conditions, I was able to conclude on the following central propositions:

> ***Proposition 1a:*** *Firms that acquire or develop valuable and rare resources can gain at least temporary economic rents by using them to develop and implement strategies.*

Proposition 1b: *If these resources are also inimitable and non-substitutable, these firms can gain persistent economic rents.*

Proposition 2a: *Firms that acquire or develop valuable resources that are inelastic in supply can gain at least temporary economic rents by using them to develop and implement strategies.*

Proposition 2b: *If these resources are also non-substitutable, these firms can gain persistent economic rents.*

Proposition 3a: *Firms that acquire or develop valuable resources under high information asymmetry can gain at least temporary economic rents by using them to develop and implement strategies.*

Proposition 3b: *If these resources are also rare, these firms can gain persistent economic rents.*

The theoretical argumentations within these propositions were basically founded on ten of the most relevant publications within RBT: seven core RBT papers, i.e., Wernerfelt (1984), Barney (1986, 1991), Dierickx and Cool (1989), Grant (1991), Mahoney and Pandian (1992), and Peteraf (1993); two additional papers addressing the criticism regarding RBT, i.e., Barney's (2001) discussion with Priem and Butler (2001) and Peteraf and Barney's (2003) discussion with Foss and Knudsen (2003); and one additional paper conducting an overview of RBT, i.e., Barney and Arikan (2001). Relying on these different perspectives of RBT, one of the main contributions of these central propositions is their linkage of the frameworks focusing on resource conditions (e.g., Barney (1991); Grant (1991)) with those arguments in the direction of factor market conditions (e.g., Barney (1986); Peteraf (1993)). This linkage will facilitate a general understanding for both parties. Furthermore, integrating and combining these publications revealed some interesting new facts:

(1) The most severe criticism towards RBT, that strategic resources underlie tautological definitions, could be refuted. Valuable resources are defined in terms of a resource's impact on the costs (reducing) and/or benefits (enhancing) associated with a firm's products and services. And even though such resources affect the firm's performance through its products, this effect is not direct nor deterministic because there may be resources which are enhancing benefit for the firm but are at the same time very costly to employ, and thus will not generate much value overall. Accordingly, strategic resources are not defined in terms of the direct performance outcomes associated with them.

(2) The debate on clearly defining RBT's dependent variable with respect to what RBT tries to explain – sustainable competitive advantage vs. sustainable rents – resulted in favor of the latter. In aiming to capture overall superior performance outcomes, rents seem to be the more suitable dependent variable since having a competitive advantage does not

necessarily guarantee gaining rents. Only if the investments, needed to implement the competitive advantage generating strategy, do not fully anticipate its value in the product market, rents are possible. Thus, competitive advantage can be seen as an indicator of the firm's potential to gain rents and other outcomes of interest, yet, not as an outcome itself.

(3) The discussion on the interconnectedness between factor markets and resource conditions provided new insights into the resource-performance relationship. Based on the prevailing factor market conditions – supply inelasticity and/or information asymmetry – it is most likely that resources implicitly possess certain conditions, such as rareness, inimitability, and non-substitutability. Within supply inelastic factor markets, valuable resources can be considered rare, and resources are per definition inimitable. Where factor markets are exposed to high information asymmetry, resources experience higher imitation and substitution barriers. Accordingly, the six central propositions were related to and refined by the respective factor market and resource conditions as outlined above.

Looking at the ***overall empirical corroboration of RBT***, results from all three integrative research methods (i.e., narrative review, vote counting, and meta-analysis) showed that we have made substantial progress within the empirical part of RBT. Results from the narrative review provided several operationalization examples on the propositions' central constructs, as well as examples for testing the propositions, and thus proved that testing these RBT propositions is possible. Remarkably, the narrative review also revealed that, despite the ongoing critique towards the lack of appropriate measurement approaches to strategic resources, more than 50 different scales for tangible and intangible resources exist, with reliability values being mostly above 0.7 (Cronbach's alpha). In addition, integrating and consolidating these scales within the narrative review produced twenty-two key items, which can offer a good starting point for future RBT research regarding the operationalization and scale-development of resources' conditions. On the subject of operationalizing the performance construct, findings from the narrative review indicated that even though authors equally argue both, rents and competitive advantages, the majority concentrates on operationalizing rents as the dependent variable. Here, one of the better, more accurate operationalization measures for rents is still considered to be Tobin's q. Finally, the analysis of operationalizing factor market conditions revealed that there are but a few exemplary context-based studies that assess the impact of resources under information asymmetry, or supply inelasticity, on performance. Regarding the results from vote counting, they indicated an overall positive significant impact of resources on performance (60% of all tests and even

68% regarding the sample size weighted results, whereas merely 4% of the results were in the opposite direction of the theory), as did the results from meta-analysis; however, the magnitude of the relationship discovered through meta-analysis was rather small (weighted mean correlation of 0.076).

Looking at the ***empirical corroboration of the central propositions***, results from all three integrative research methods showed that most empirical researchers focused on the generic propositions 1a and 1b and tended to neglect the impact of factor market conditions. Moreover, results from the narrative review also showed that on the subject of operationalizing strategic resources (a) still 35% of resource-based empirical studies fell short on the operationalization of the central constructs' conditions, and rather concentrated on resources in general; (b) about 60% of the studies did not provide with an adequate resource definition, i.e., it was not distinguishable whether they referred to a unique resource or a resource-bundle; and (c) the inimitability, rareness, and non-substitutability conditions were under-represented. Apparently, researchers still continue to focus on measuring value, while disregarding the remaining construct's conditions and are thus not fully and truly exploring the central propositions. Results from vote counting revealed that all six propositions were supported (54% (1a), 71% (1b), 60% (2a), 50% (2b), 78% (3a), and 37% (3b); percentage of supported tests). However, based on the 33% rule,[641] results with respect to the percentage of supported tests weighted by sample size (N) indicated that proposition 3b could not be supported. Also, vote counting results emphasized again that factor market conditions have evidently not found their way into many empirical tests, i.e., merely 16% of the studies discussed and explored the impact of factor market conditions on resources and, respectively, on performance. Since propositions 2a and 2b did not provide enough tests to conduct meta-analyses, only the remaining propositions were tested. Here, results from the meta-analysis revealed that all four propositions were supported, yet showing rather small impacts (0.107 for proposition 1a, 0.050 for proposition 1b, 0.203 for proposition 3a, and 0.179 for proposition 3b). Nevertheless, the results corresponded with the vote counting results.

Looking at the ***empirical results for specific resource categories and sub-categories***, findings from the narrative review emphasized the special attention to intangible resources, i.e., 72% of the empirical studies concentrated and operationalized intangibles. Here, results from vote counting underscored the importance of intangible resources by showing that these clearly outperformed tangible resources (62% supported vs. 29% supported). With intangible

[641] I.e., a positive (negative) effect is given if the relative frequency of the significant positive (negative) results exceeds 33%.

resources, capabilities showed the most support, followed by intangible assets (especially reputation) and human resources (especially management and CEO). In general, meta-analyses results were consistent with vote counting results in this respect; however, some difference to vote counting results could be revealed regarding the resource categories of capabilities, physical capital, and financial capital. Here, vote counting results produced strong supportive results for capabilities and only weak support for physical and financial capital; whereas the correlation results of the meta-analysis were quite the contrary. Hence, these differences emphasize that without the magnitude of a proposed relationship, vote counting results cannot be put into perspective and misinterpretations might be the consequence. Furthermore, two results regarding the resources' sub-categories were rather surprising: the non-significance of the correlations of patents and organizational capabilities. Patents have been widely applied within RBT, sometimes as a resource, yet sometimes as a proxy for other resources, such as R&D capabilities. Thus, the alternative utilization of patents leads to difficulties in interpreting and integrating these results and might bias the true nature of the relationship. On the grounds that the definition of organizational capabilities is rather overarching, those results might be due to imprecise classification, which was affirmed by the empirical examples. Accordingly, studies with rather misrepresented or all-embracing resource definitions will either disable a correct integration of results or, worse, lead to inaccurate results.

Looking at the ***dependent variable applied within empirical tests of RBT***, some further conclusions can be drawn, arguing the necessity to assess differing performance levels. Results from the narrative review indicated that there were hardly any studies that surveyed different performance aggregation-levels in order to detect and outline the overall net effect. And even though results from vote counting showed that firm-level performance measures (especially stock market and accounting returns) received slightly more support than lower-level performance measures, results from meta-analysis revealed that the relatively high correlation coefficient of operational performance affirms that it is important to acknowledge the whole cause and effect chain of the overall superior performance, since the impacts of resources on the different performance levels might vary. Consequently, measuring only an increase or decrease in firm performance may be misleading.

Additionally, integrating the results from the narrative review, vote counting, and meta-analyses, revealed ***some further insights and deficits of empirical RBT research***:

(1) The huge amount of non-significant vote counting results hints at the problem of predetermining the actual strategic resources of firms.[642]

(2) The proportion of tests counter to RBT (vote counting) is more than twice as high for proxies compared to constructs, which might hint at a misapplication of the respective proxies and emphasizes the use of constructs. Moreover, results from meta-analysis confirmed the importance of assessing the strategic value of resources through constructs instead of proxies, as the correlation coefficient was almost three times higher for data-types relying on constructs.

(3) The mixed findings towards the utilization of operationalization measures (vote counting) underline the adherent necessity of properly defining the resources under investigation, and agreeing upon generally accepted categorizations and definitions. By using the same proxy for measuring totally different resources, integrating the results and gaining information not only becomes difficult, but also does not seem to be constructive.

Finally, some conclusions can be drawn from the methodological review in chapter 5, which outlined several suitable methods to uncover unobservable constructs, such as strategic resources. It might not always be easy and it definitely takes a lot of effort, however, these methods are capable of getting to the core of the value, rareness, inimitability, and non-substitutability conditions of strategic resources. More specifically, ***the review indicated the following best practices***:[643]

(1) Researchers should rely on hybrid research designs, i.e., combine case studies with surveys, because case studies help to acknowledge all important firm-specific resources and capabilities of particular industries, whereas a large sample-sized survey will then provide a sufficient amount of empirical data on the subject.

(2) Researchers should concentrate on longitudinal research designs, in order to assess sustainability of performance differences, as well as be able to properly explore inimitability and non-substitutability, especially with regard to their path dependency and time compression dimensions.

(3) Researchers should predominantly employ primary data, using additional secondary data sources merely for (cross-) validation and completion. Insider information is preferred,

[642] With non-significant results, the resources' strategic value could not be affirmed and researchers simply concluded that those specific resources were not valuable for this specific firm (or industry).
[643] Table 49 through Table 51 within chapter 5.2.3 provide comprehensive checklists in this regard.

yet, should be supplemented with outsider information (experts, e.g., consultants, academics, etc.) for raising objectivity.

(4) Researchers should make use of data collection methods, which are capable of providing in-depth information as well as uncovering the chain of cause and effect. Exemplary methods are, for instance, expert and narrative interviews, as well as interviews focusing on critical incidents, self-Q interviews, diaries, repertory grid techniques, cognitive mapping techniques, and group discussions (focus groups), plus observational approaches and analytic methods, such as content analysis, grounded theory approach, or network analysis.

(5) Researchers should utilize data analysis methods, which are suitable for (a) handling longitudinal data (e.g., partial adjustment models, equilibrium analysis, time series approaches, data envelopment analysis); (b) including context and discrete events (e.g., event history studies, event studies, co-plot methods); as well as (c) assessing causal structures (e.g., structural equation models, causal mapping procedures, network analyses).

In reference to these main conclusions, some further research deficits appeared, which will be outlined in the following, along with the limitations of this dissertation.

6.2 Limitations and Future Research Agenda

The main conclusions outlined above have already indicated some limitations and hinted at future research in this respect.

First of all, one of the major problems of empirical research within RBT still seems to be located in the accurate definition of strategic resources, i.e., empirical studies tend to fall short on precise resource categorizations. Accordingly, I had some difficulties while coding the relevant data for the narrative review, the vote counting analysis, as well as the meta-analysis, since the lack of proper resource definitions sometimes impeded a clear-cut categorization scheme. Thus, the allocation of resources to respective resource categories might be slightly biased, which again emphasizes the necessity for researchers to provide comprehensive and exact resource definitions.

Second, since over 60% of the resource definitions within the 192 empirical contributions do not provide a precise distinction as to whether they refer to unique resources or resource-bundles, the validity of disaggregating resources in this connection can be questioned. Through disaggregating resources of interest into easily operationalizable constructs, as most

of the researchers have done, the relatedness of these resources within the firm's network of resources is neglected. Thus, the present analysis is not capable of analyzing resources' social complexity and their interconnectedness in this respect. Here, future research might employ Mannor and Shamsie's (2005) different resource perspectives, categorizing resources and RBT research according to the stand-alone resource perspective, the resource combination perspective, as well as the resource management perspective.[644]

Third, given that only 19% of the studies operationalized resource conditions besides value, the present vote counting analysis and meta-analysis of the central RBT propositions also includes those studies that argumentatively assessed the rareness, inimitability, or non-substitutability of resources. Otherwise, sample sizes would have been too small for conducting vote counting or meta-analysis. As RBT research evolves, future research might be able to add to this analysis in this respect, focusing on (a) the separate impacts of rareness, inimitability, and non-substitutability on rents; as well as analyzing if (b) sustainable performance increases more if resources are simultaneously valuable, rare, inimitable, and non-substitutable than if they are deficient in any of these characteristics. The scales identified through the review will be helpful in this connection and stimulate further development of specific strategic resource scales. Additionally, more research is needed that specifically focuses on the underlying mechanisms of the different dimensions of the resource conditions, e.g., studies such as Knott et al.'s (2003) resource accumulation model focusing on time compression and path dependencies.[645]

Fourth, as factor market conditions have been widely neglected within empirically tested RBT propositions, the present meta-analysis could not provide results for the impact of resources on rents under supply inelastic factor markets due to small sample sizes. Therefore, future research should intensify, exploring the different effects of factor market conditions on resource conditions and, hence, on performance. Also, future research might discover some coherence between resource categories and specific factor market conditions in this respect. Similarly, due to small sample sizes, the present meta-analysis was not capable of providing hierarchical results. Such results would have given more insights into the magnitude of the relationships for specific resource categories and performance impacts against the background of certain factor market conditions. Again, with a sufficient amount of primary studies, future research might be able to contribute to this deficit by conducting hierarchical meta-analysis.

[644] Cf. Mannor/Shamsie (2005).
[645] Cf. Knott et al. (2003).

Fifth, throughout this dissertation it became apparent that researchers – due to the idiosyncratic nature of a firm's resources and capabilities – need to interpret their results in reference to certain industry and environmental conditions. Put differently, context-based studies are inevitable in order to fully understand and apply the empirical results. Unfortunately, the available data within the 192 studies did not provide enough information on the different industry and environment settings to allow a comprehensive context-based categorization in the present meta-analysis. Accordingly, future research should put more focus on producing results that could specify contexts of relevance in connection with specific resources. Brush and Artz (1999), Carmeli (2004), and Miller and Shamsie (1996) are inspiring examples of these kinds of studies.[646] Then, future meta-analyses might be able to categorize the magnitude of resource-performance relationships against the background of specific industry and environment conditions.

Sixth, a categorization of meta-analytic results on resource-performance relationships might also be interesting, with reference to specific strategic behavior. For instance, Barney and Arikan (2001) suggest exploring (a) whether corporate strategies, such as mergers, acquisitions, and diversifications, that exploit valuable, rare, inimitable, and non-substitutable resources generate more performance than corporate strategies that exploit other kinds of resources; (b) whether international strategies that exploit valuable, rare, inimitable, and non-substitutable resources generate more performance than international strategies that exploit other kinds of resources; or (c) whether strategic alliances that exploit valuable, rare, inimitable, and non-substitutable resources will outperform other kinds of alliances.[647]

Seventh, some results from the meta-analysis still indicated that there might have been more moderators present, which, however, could not be explored due to small sample sizes. Especially regarding the results of the HR sub-category of specific HR skills and knowledge, the meta-analysis inferred that less than 17% of the variance was explained due to sampling error. Hence, future research should concentrate more on defining and determining different HR categories with their different abilities and skills. Solely analyzing HR as a bundle does not provide sufficient information on the resource-performance-relationship. Accordingly, future research designs could employ more specialized methods, i.e., methods that assess the

[646] Cf. Brush/Artz (1999); Carmeli (2004); Miller/Shamsie (1996).
[647] Cf. Barney/Arikan (2001), p. 146.

strategic value of individual resources, such as qualification diagnosis and qualification forecast tests.[648]

Eighthly, regarding the criticism referred to in chapter 2 on the limited prescriptive implications, studies that derive suitable RBT implications for management exist, yet, are still rare. More studies are needed that focus on managerial manipulation with respect to the four resource conditions. A prime example in this connection is provided by McWilliams et al. (2002), who concentrate on the question of how firms can enforce specific resource conditions, specifically analyzing non-substitutability. The authors demonstrate that political strategies, aimed at raising rivals' costs by blocking the use of substitute resources (legally binding the use of a specific resource), may create the opportunity for a firm to capitalize on resources that are valuable, rare, and costly to imitate:

> In 1991 Lodwrick Cook, Chairman of Atlantic Richfield Company (ARCO), announced that ARCO had developed a new, cleaner burning gasoline using a formula it named EC-X. According to Cook, ARCO would produce this less polluting gasoline only if California mandated that all gasoline sold in the state be produced using the same formula. A month later, ARCO's motives were called into question in a Forbes magazine article (Mack, 1991). Forbes reporter, Toni Mack, pointed out that the ECX formula was better suited to ARCO's refineries and crude oil supply than to ARCO's competitors' resources. Based on this, Mack accused Cook of attempting to 'push up his competitors' refining costs more than his own'. Cook denied the charge, saying that 'There comes a time when you want to do what seems right for your company, for your industry, and for the public you serve'. Presumably, any competitive advantage gained would be incidental to the loftier goals of serving the public. (McWilliams, Fleet, and Cory (2002), p. 707)
>
> Within the context of the resource-based view of the firm, RRC strategies can be used to gain a sustainable competitive advantage or eliminate a competitive advantage. If a manager recognizes that the firm controls some resource that is valuable, rare, and costly to imitate, but is not non-substitutable, (s)he may be able to use political strategies to create non-substitutability and turn a temporary competitive advantage into a sustainable competitive advantage. Furthermore, the use of RRC strategies is often facilitated by the nature of the regulation desired, which can be justified as resulting in such desirable outcomes as restricting child labour, saving American jobs, and protecting the environment. Such justifications make it easy for politicians to support the desired regulation. (McWilliams, Fleet, and Cory (2002), p. 718)

Through using these strategies, the company was able to enforce non-substitutability for their strategic resources. Future research should evaluate further possibilities in this connection.

Overall, the analyses within this dissertation show that we have made substantial progress in the empirical part of RBT. In general, the empirical results supported resource-based theory, yet, this outcome did not really come as a surprise: due to the studies' research models, which

[648] Cf. Berthel (2000), p. 131. While the former identifies current abilities of a person, the latter inquires potential abilities of a person. For instance, achievement or attainment tests evaluate the person's current level of knowledge and ability, which has been reached after a certain period of experience or training, e.g., to ensure that a particular standard has been reached. Furthermore, aptitude tests measure a person's ability level regardless of previous experience, and inform about the person's capacity to learn new skills. Generally, these tests may be divided into those assessing a collection of traits and those focusing on more specific abilities and thus explore the impact of more structured HR capabilities on performance. Cf. Searle (2003), p. 137.

were in general on a very high level of analysis, scholars were evidently able to prove the more obvious relationship between 'some' resources and high-level performance, e.g., that R&D capabilities will increase firm performance. However, the more interesting questions here would be to differentiate on different levels as well as different contexts: which resource will increase sustainable performance on what level and under which circumstances? Also, does sustainable performance increase more if this resource is simultaneously valuable, rare, inimitable, and non-substitutable than if it is deficient in any of these characteristics? In other words, current empirical resource-based research is still lacking a thoroughly and systematically assessment of the core tenets of the theory as well as exploring the theory's relevant constructs in more detail. Regarding the research models, to constrain the research focus and thus lower, respectively specify the level of analysis, researchers should focus on a more detailed categorization of resources and resource characteristics, try to split up the performance impacts into various levels, and concentrate on sustainability, as well as include context variables. Incorporating this systematic can then lead to a thorough survey of strategic resource types for categorized circumstances and performance levels.

However, despite this missing systematic, by weighing all the arguments, this dissertation was nonetheless able to show that the evolving empirical tests of resource-based theory affirmed that it is possible to derive testable assertions from this theory and that RBT has evidently – both theoretically and empirically – been established within the field of strategic management.

Appendix

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(1) Specification of Research Areas

RESEARCH AREA	DESCRIPTION
Business Policy and Strategy	Specific domain: the roles and problems of general managers and those who manage multi-business firms or multifunctional business units. Major topics include: strategy formulation and implementation; strategic planning and decision processes; strategic control and reward systems; resource allocation; diversification and portfolio strategies; competitive strategy; cooperative strategies, selection and behavior of general managers; and the composition and processes of top management teams.
Entrepreneurship	Specific domain: the creation and management of new businesses, small businesses and family businesses, and the characteristics and special problems of entrepreneurs. Major topics include: new venture ideas and strategies; ecological influences on venture creation and demise; the acquisition and management of venture capital and venture teams; self-employment; the owner-manager; management succession; corporate venturing and the relationship between entrepreneurship and economic development.
Human Resources	The Human Resource Division is dedicated to a better understanding of how work organizations can perform more effectively by better management of their human resources. That is, we are interested in understanding, identifying, and improving the effectiveness of HR practices (whether in the U.S. or in other countries) in the various functions and activities carried out as part of HR and determining the optimal fit between these practices and organizational strategies, cultures, and performance. Major topics include acquisition, allocation, development, utilization, maintenance, and evaluation of humans as resources in work organizations. The emphasis is on the study of the employment relationship at the individual, group, organizational, societal, and cross-cultural levels of analysis and the impact of this relationship on outcomes critical to the organization and its applicants, both present and past employees and their representatives.
International Management	Specific domain: content pertaining to theory, research and practice with an international or cross-cultural dimension. Major topics include: investigations of the adjustments organizations make in order to succeed in various countries; investigations of the cross-border management of operations, including multi-country, multi-unit strategy formulations and implementation; investigations of evolving organizational forms and management practices that are the consequence of the interaction of two or more socially-embedded, multi-level, evolving business processes (from individual to supranational) and their outputs; investigations of the cross-border differential impact of cultural, social, economic, technological, and political forces on organizational forms and management practices; the comparative management studies; and other research with an international dimension.
Operations Management	Specific domain: focuses on the management of the transformation processes that create products or services. These processes are found in all organizations including profit and non-profit organizations. Conceptual, empirical, and methodological contributions are encouraged, as are cross-functional linkages and perspectives. Major topics include operations strategy, product and service development, supply chain management, project management, quality management, as well as international, human resources, environmental, and IT issues facing operations.

RESEARCH AREA	DESCRIPTION
Organization and Management Theory	Specific domain: involves building and testing theory about organizations, their members and their management, organization-environment relations, and organizing processes. The area has a rich intellectual heritage. Theoretical advances in organization theory have included strategic choice, resource dependence theory, organizational ecology and institutional theory. More recently, we have provided a home for critical, feminist, cognitive, and post-modern theorists. We encourage new theory development and the application of our existing theory base to such emerging and continuing management challenges as quality improvement, strategic alliances, new technology implementation, organizational restructuring, governance and control, and strategic global diversity. The division celebrates theoretical activity, methodological pluralism and linkages between theory and practice. Major topics regarding resource-based theory: firm vs. industry effects (The RBV suggests that firm effects should have a larger impact on firm performance than industry effects. This research examines the relative impact of industry attributes and firm attributes on firm performance) and the impact of resources and capabilities (RBV suggests that valuable, rare, and costly-to-imitate resources can be sources of sustained competitive advantages. This research examines a variety of different resources that have these attributes to varying degrees, and examines their impact on performance.).
Technology & Innovation Management	Specific domain: encourages interdisciplinary scholarship and dialogue on the management of innovation and technological change from a variety of perspectives, including strategic, managerial, behavioral, and operational issues. The problem domain includes the management of innovation processes, research and development, information technologies, e-commerce, and process technologies. Participants in this broad academic endeavor come from a wide range of disciplines and draw on an extensive array of theoretical and research paradigms. We enter this complex problem domain in the spirit of dialogue, debate, and deepened understanding. Major topics include: studies of the strategic management of technology; innovation processes; innovation diffusion and the development, implementation and use of technologies; technology development trajectories; intellectual capital; organizational processes by which technically-oriented activities are integrated into organizations; product development strategies; technical project management; behaviors and characteristics of technical professionals; technological forecasting and policies; information technology; impacts of new technologies on organizational forms and electronic commerce.

Table 52: Specification of Research Areas

(2) Research Questions and Findings of the 192 Empirical RBT Studies

Research Area: Business Policy and Strategy

Authors	Year	Research Questions	Findings
Anand & Singh	1997	The authors address the differences in performance outcome between diversification- and consolidation-oriented acquisitions in industries within the defense sector, which has experienced significant decline.	Consistent with resource-based logic, the results show that consolidation-oriented acquisitions outperform diversification moves. Moreover, the authors find a positive relationship between Tobin's *q* and corporate focus, as well as show that assets from declining industries are better redeployed through market mechanisms rather than within the firm.
Bergh	1998	The author investigates whether portfolio restructuring undertaken in response to changes in product-market uncertainty has implications for financial performance. A model that integrates information-processing and resource-based theories was applied to data from a panel of 168 Fortune 500 companies.	Analyses show that product-market uncertainty is associated with two different types of restructuring strategies, which represent different theoretical approaches to portfolio restructuring. The results further show that portfolio restructuring actions influenced performance, and indicate when each restructuring strategy should be used to achieve the highest financial performance. Results underscore the importance of defining restructuring to include both acquisition and divestitures, following such actions over time, and examining the characteristics of the units involved in restructuring. These findings suggest that managers utilize acquisition and divestiture as joint actions in managing their families of subsidiary units.
Bergh	1996	Based on a panel of 168 Fortune 500 companies and using an integrative model, the author tests the effects of product-market uncertainty and portfolio restructuring relatedness on performance.	Results show that firms that acquired related businesses and/or divested unrelated businesses in response to increases in uncertainty had the highest performance records.
Borch, Huse & Senneseth	1999	The authors focus on the relationship between firm resources and strategic orientations, based on a study of 660 small firms. Applying the RBV, they considered entrepreneurship and small business management as firm behavior – in contrast to focusing only on decisions and characteristics of the small business manager.	The results show that 'managerial firms' were analyzers and used market strategies. 'Traditional firms' avoided growth or risk-taking strategies. Firms having few resources lacked strategic orientation and were stuck in the middle.
Bourke	2000	This paper presents a model of the determinants of trade in higher education, using the example of foreign students deciding to finish their studies abroad.	The results identify many variables which impact on a student's decision to study overseas, and their choice of destination, being informational resources the most critical ones amongst them.

Research Area: Business Policy and Strategy

Authors	Year	Research Questions	Findings
Capron	1999	The authors examine the creation of value within horizontal mergers and acquisition using the data from 253 mergers and acquisitions, initiated by European and U.S. firms in manufacturing industries for the period of 1988-1992. In particular, the authors emphasize the impact of post-acquisition asset divestiture and resources redeployment on the long-term performance of horizontal acquisitions.	Results show that both asset divestiture and redeployment can contribute to acquisition performance with, however, a significant risk of damaging acquisition performance when divested assets and redeployed resources are those of the target: (1) the divestiture of the acquirer's assets, has a positive impact on cost savings; (2) the divestiture of the target's assets (three to five times more likely to occur) does not reduce costs and damages capabilities; (3) resource redeployment from acquirers to targets not only improves revenue-enhancing capabilities (market coverage and innovation capabilities) but also reduces costs; (4) resource redeployment from targets to acquirers also improves revenue-enhancing capabilities, but in some cases can hurt acquisition performance; (5) asset divestiture and resource redeployment commonly intertwine.
Capron, Dussauge & Mitchell	1998	This paper examines the impact of resources on their redeployment between target and acquiring businesses following horizontal acquisitions.	The authors find out that the magnitude of redeployment of resources subjected to market failure in horizontal acquisitions between the European and North American firms increases with the asymmetry of the merging companies' relative strength on the resource dimensions (R&D, manufacturing, marketing, managerial, and financial).
Chatterjee & Singh	1999	The authors develop hypotheses for reciprocity between the type of diversification and mode of expansion decisions. The specificity of antecedent resources that affect these two decisions is being considered and conceptually demonstrated that there is a contradictory tension in trying to optimize the decisions jointly implying that one or both diversification decisions have to be sub-optimized.	The results suggest that one antecedent factor – internal funds – act as the key mediating influence in the joint optimization and leads to a subordination of the mode decision in the joint optimization process. However, the existence of time compression economies and market power benefits are the exceptions to this subordination and trade off process.
Coff	1999	The author examines the impact of knowledge on merger and acquisition strategies both theoretically and empirically.	The results show that firms that seek acquisitions of targets in knowledge-intensive industries coped with the information dilemmas associated with knowledge-based assets by (a) offering lower bid premiums, (b) using contingent payment, and by (c) increasing information both through lengthy negotiations and by avoiding tender offers.
Combs & Ketchen	1999	In this paper, inter-firm cooperation and its performance implications are examined in the context of the resource-based view and organizational economics. The research is based on 94 publicly-held restaurant chains.	The results of the paper imply that publicly-held restaurant chains emphasize resource-based concerns over considerations of cost-minimizing when deciding whether to engage in inter-firm cooperation. However, some firms suffer loss of performance due to this emphasis.

Research Area: Business Policy and Strategy

Authors	Year	Research Questions	Findings
Connell	2002	This paper analyzes sustainable performance effects of Jardine, Matheson & Company, a Hong Kong trading firm founded in 1832 that continues into the 21st century. The author's work focuses on the ongoing success and survival in a highly uncertain social and political environment: (i) How and why did Jardine & Matheson's founders and managers choose to develop particular resources and services? (ii) What was the nature and purpose of the external organization that Jardine & Matheson sought to shape and nurture? (iii) How did that external organization evolve as the shaper's perception of productive opportunities changed to reflect the migration of value from trading to investment by 1885?	The argument is made that Jardine, Matheson & Company was the inheritor and builder of a network of trading relationships that grew out of the very special business, social and political environment in China during the early nineteenth century. The opportunity – as well as the uncertainty – of the China trade made profitable a range of services to businesses and individuals that protected their investments and shipments, while Jardine, Matheson & Company absorbed the risk. The firm was in a position to do this so long as it did not invest in the commodities in which it traded or which it insured. Fundamental to Jardine, Matheson's success and the reputation the firm built for financial probity was the fundamental strategic decision to eschew speculation and to concentrate on building up a pattern of relationships within and outside the business which would foster the flow of information, the knowledge with which to interpret it, the ability to influence others and the reputation to attract and retain trading partners.
Darnall	2003	This study combines institutional theory and the RBV to empirically evaluate a firm's decision to certify its environmental management system (EMS) to ISO 14001, the international EMS standard.	The results show that firms with demonstrated experience in continual improvement concerning environmental affairs have fewer barriers pursuing advanced environmental strategies. The second primary finding was that early adopters' ISO 14001-certification decisions were influenced by their prior internal capabilities.
Deephouse	1999	The authors develop an integrative theory of strategic balance – moderately differentiated firms have higher performance than either highly conforming or highly differentiated firms.	The results show that firms should be as different as legitimately possible, and follow intermediate levels of strategic similarity that balance the pressure of competition and justification legitimation.
Dussauge, Garrette & Mitchell	2000	The authors examine alliances between companies as indicators of inter-partner learning and assume that alliances in which the partners contribute asymmetric knowledge (link alliances) tend to favor skill transfer and that alliances in which the partners contribute similar knowledge (scale alliances) are more likely to continue without substantial skill transfer. They hypothesize that reorganization and takeover will be more common for link alliances than for scale alliances.	The results suggest that partners are more likely to reorganize or take over the link alliances (different capabilities); scale alliances (similar capabilities) are more likely to continue without material change. Link alliances seem to lead to greater levels of learning than scale alliances do, but there is no difference in the length of duration between the two types.
Farjoun	1998	The first research question focuses on differences vs. relatedness of skill and physical bases within the same set of industries (or lines of business). The second question analyses the separate and joint contributions of the two approaches in explaining firm performance differences.	The results show that a multidimensional definition based on skill and physical bases of relatedness improves the explanatory power of relatedness in diversified companies and their performance. Second, skill and physical bases alone had no significant effects on most indicators of financial performance.

Research Area: Business Policy and Strategy

Authors	Year	Research Questions	Findings
Geringer, Tallman & Olsen	2000	The authors examine the relationship of different degrees of product diversity and international geographical diversity with performance regarding large Japanese multinational manufacturing firms. Also, they examine whether diversification strategies and their performance impacts are constant or vary with changes in context.	Results show, that while diversification strategies of Japanese companies between 1977 and 1993 vary between keiretsu and non-keiretsu firms, performance is not much different. International diversification has negative profitability and positive growth consequences in some periods. Product diversity has weak effects on firm performance only in one time period.
Glucksman & Morecroft	1998	This study focuses on why companies that seem to have every advantage are overtaken by apparently weaker competitors.	The results imply that managers should complement an evolutionary understanding of their business environment with insights from a related way of seeing things and from business dynamics to build a 'dynamic resource system view' of their business.
Guillen	2000	The key contribution of this study is to conceptualize a resource-based view of business groups in emerging economies and to test empirically whether it surmounts the shortcomings of existing explanations.	The results show that a resource-based view of business groups in emerging economies helps surmount the theoretical and empirical limitations of economic, sociological, and late-development theories precisely because it compares the advantages and disadvantages of focused firms, diversified groups, and foreign multinationals under different political-economic circumstances.
Gulati	1999	The author concentrates on the role of network resources and firm capabilities in determining alliance formation.	The results show that accumulated network resources arising from firm participation in the network of prior alliances (embeddedness) are influential in firms' decisions to enter into new alliances.
Harrison, Hall & Nargundkar	1993	This study analyzes the impact of diversification on performance.	The main findings show that consistency (measured as similarities in financial resource allocation) across business in the emphasis given to R&D is positively related to the performance. However, there was no support for capital intensity as a source of superior performance for diversified firms.
Harrison, Hitt, Hoskisson & Ireland	1991	The authors analyze if uniquely valuable synergy might be created where differences (versus similarities) between resources in the acquiring and target firms exist.	The results show that differences (not similarities) in resource allocations between targets and acquirers led to higher post-merger performance. Thus, a focus on specific resources rather than strategy types in the merger and acquisition research may better explain firm performance.
Hitt, Dacin, Levitas, Arregle & Borza	2000	The authors explore different selection priorities between market firms, focusing on how international strategic alliance partner selection priorities differ between emerging and developed market firms.	Results show that the emergent market firms more strongly emphasized partners' financial assets, technical capabilities, intangible assets, and willingness to share expertise than did the developed market firms. The latter emphasized partners' unique competencies and market knowledge and access compared to emergent market firms.

Research Area: Business Policy and Strategy

Authors	Year	Research Questions	Findings
Hitt, Hoskisson & Kim	1997	This study analyzes the impact of international diversification on innovation and firm performance in product-diversified firms.	Early effects of international diversification on performance are found to be positive. Increased international diversification at some point will become highly complex, hard to manage, and thus, hurting performance (especially for single-business firms). Product diversification moderates the curvilinear relationship between international diversification and performance.
Jolly	2000	Relying on RBT, the author suggests the distinction of three generic resource-based strategies: the market stretcher, the techno explorer, and the full deployer.	The examination of a set of case studies tends to show that high growth is usually reached through a commitment to a full deployment strategy. All three strategies are intrinsically oriented towards innovation.
Judge & Douglas	1998	This paper explores the ability of firms to integrate a critical strategic issue – the natural environment – into their strategic planning process within the natural RBV.	Results provide strong support: the level of integration of environmental management concerns in the strategic planning process was positively related to financial and environmental performance.
Lane & Lubatkin	1998	The authors assume that a firm's ability to learn from another firm depends on the similarity of their (1) knowledge bases, (2) organizational structures and compensation policies, and (3) dominant logics.	The results show that the similarity of the partners' basic knowledge, lower management formalization, research centralization, compensation practices, and research communities were positively related to inter-organizational learning.
Li, Lam, Karakowsky & Qian	2003	This study examines the relationship between firm resources and first-mover advantages with regard to foreign direct investment in China. Based on the RBV, the authors hypothesize that a firm's resources moderates the relationship between the timing of entry and firm performance.	Empirical analyses of data from a sample of MNEs competing in China show evidence supporting their hypotheses.
Lorenzoni & Lipparini	1999	This paper studies the process of vertical disintegration and focuses on the ability to coordinate competencies and combine knowledge across corporate boundaries. The authors argue that the capability to interact with other companies (relational capability) accelerates the lead firm's knowledge access and transfer with relevant effects on company growth and innovativeness.	The results confirm that 'relational capability' accelerates a firm's knowledge access and transfer. This affects company growth and innovativeness in the packaging machine industry. Results show that managers can deliberately shape and design the inter-firm network (supplier relationships) to develop the capability to integrate knowledge residing both internal and external to the firm's boundaries.
Marcus & Geffen	1998	The authors' try to explain the process of change at the system level to examine competency acquisition by specific firms embedded in the system. They combine an organization theory focus on macro-system change with a strategic management focus on firm-specific competency acquisition.	Results show that societal forces such as governments and markets influence a firm's capacity to search for talent, technology, and ideas, and to harmonize what it learns internally. These then contribute significantly to the acquisition and creation of new competencies.

Research Area: Business Policy and Strategy

Authors	Year	Research Questions	Findings
Markides & Williamson	1996	This study analyzes whether related diversification enhances performance, also concentrating on the role of organizational structure.	The results show that related diversification enhances performance only when it allows a business to obtain preferential access to strategic assets that are rare, valuable, and highly inimitable. To sustain these supernormal profits, a firm has to build new strategic assets more quickly and efficiently than the competitors. Still, inter-unit transfer and sharing of these competencies are a necessary condition.
McGee, Dowling & Megginson	1995	The authors' research question deals with the following strategic decision: Should inexperienced managers cooperate simply to gain new knowledge and experience or should they not cooperate unless they are experienced enough to know what they don't know?	The results show that new high-tech ventures that have management teams with more functional expertise in the area that is most closely related to their choice of competitive strategy (e.g., marketing, R&D) were most successful in their cooperative agreements.
McWilliams, Fleet & Cory	2002	The authors extend the resource-based theory in order to test, whether it can be used to analyze the effectiveness of competitive strategies. They research if political strategies aimed at raising rivals' costs by blocking the use of substitute resources may create the opportunity for a firm to capitalize on resources that are valuable, rare, and costly to imitate.	Results show that within the context of the resource-based view of the firm, RRC strategies can be used to gain a sustainable competitive advantage or eliminate a competitive advantage. If a manager recognizes that the firm controls some resource that is valuable, rare, and costly to imitate, but is not non-substitutable, (s)he may be able to use political strategies to create non-substitutability and turn a temporary competitive advantage into a sustainable competitive advantage.
Michael & Robbins	1998	The authors follow empirical retrenchment evidence scientifically. Their research question includes the following two aspects: (1) Is retrenchment prevalent among small firms during recession? (2) Which cost, asset, and human factors of production are priorities for retrenchment? They try to identify exactly when and how to retrench in applying retrenchment research to managerial practice.	Results show that retrenchment can be identified as a common but not universal response of small firms to recession: over two-thirds of the firms in the sample retrenched during the 1990-1991 recession. They used both cost and asset reduction in their retrenchment. Given the unique nature of small firms, retrenchment is likely to be the primary, if not exclusive, strategic option available during recession. Also, the cost and asset factors most commonly used for retrenchment are those most procurable in factor markets containing little or no asset specificity.
Minshall & Garnsey	1999	The authors concentrate on corporate acquisitions and their mechanism for maintaining growth in conditions of technological uncertainty. Agreeing upon very high failure rates, their paper present a resource-based framework for analyzing corporate acquisitions in times of rapid technological change.	Results show that such acquisitions can be used to access resources that are of immediate use, but also enhance the acquirer's ability to access resources in the future.
Park, Mezias & Song	2004	This study focuses on how alliances of e-commerce firms affect firm value in an emerging business sector.	The findings show that alliances of e-commerce firms have a positive effect on firm value, whereas marketing alliances generate significantly greater firm value than technology alliances. Alliances with other e-commerce partners have no significant different effect on firm value than alliances with bricks-and mortar partners.

Research Area: Business Policy and Strategy

Authors	Year	Research Questions	Findings
Poppo & Zenger	1995	This study examines competing theoretical explanations for make-or-buy decisions. The authors develop and test a model of the determinants of exchange performance for both internally- and externally-sourced information services.	The results prove a strong support for the transaction cost explanation of the boundary choice. Firm-specificity appeared to damage the performance of market exchanges and thereby encouraged vertical integration. The results did not, however, support the theoretical link between firm-specificity and vertical integration as advanced by resource-based theorists: there was no significant relationship between firm-specificity and the performance of internally-governed activities. Thus, the results suggest caution in assuming that the common language and unique routines accessible through hierarchy necessarily improve an activity's performance.
Robins & Wiersema	1995	The research work in this paper tries to narrow the gap between the theory of the multi-business firm and empirical study of the link between relatedness in corporate portfolios and performance.	The results show that resource-based measure of 'portfolio relatedness' in terms of shared strategic assets such as know-how or capabilities significantly accounts for the differences in performance of large diversified firms.
Russo & Fouts	1997	The authors explore the influence of environmental and economic performance on industry growth.	Results show that environmental performance and economic performance are positively related and that this relationship is strengthened in high-growth industries.
Sakakibara	1997	This study proposes capability heterogeneity of R&D consortia participations as a condition to distinguish two competing motives for cooperative R&D: cost-sharing vs. skill-sharing.	Results show that skill-sharing R&D cooperation can be competition-enhancing and that cost-sharing R&D can be competition-suppressing. Additionally, the skill-sharing motive of partners increases R&D investment.
Silverman	1999	This study surveys how a firm's resource base affects the choice of industries into which the firm diversifies and operationalizes technological resources at a more detailed level than in prior studies, thereby enabling a more stringent analysis of the direction of diversification.	The results imply that the predictive power of the RBV is greatly improved when resources are measured at a finer level.
Stevens & Bagby	1999	The authors examine processes and structures by which intellectual property (IP) is transferred from key research universities to business in the context of government policies and societal needs.	The results show that there is a necessity for businesses to control critical IP resources to achieve and sustain competitiveness.
Szeless, Wiersema & Muller-Stevens	2003	This study investigates firm relatedness and its further relationship to accounting and market-based performance measures within a sample of European firms.	The results confirm a positive, significant relationship between resource-based relatedness and firm performance for German, Swiss, and Austrian multi-business firms and thus, provide further evidence that resource-based relatedness of large diversified manufacturing firms can help explain variability in firm performance across different institutional environments.

Research Area: Business Policy and Strategy

Authors	Year	Research Questions	Findings
Tallman	1991	The authors develop a model of MNE market entry from the perspective of the resource-based view.	The model explains performance differences through a combination of resource, strategy, and structural measures. Firm-specific factors in a particular host environment were more powerful in explaining performance than the measures of worldwide, broad skills of the parent company.
Pett & Wolff	2003	The North American Free Trade Agreement (NAFTA) may present significant opportunities or significant threats for small and medium-sized firms based in the US. The authors develop arguments that explore the relationship among four internal firm characteristics and managers' perceptions of NAFTA.	The findings imply that managers' exhibiting favorable perceptions of NAFTA are related positively to differentiation strategy, performance, export experience, and size. A cost-leadership strategy demonstrated no discernable relationships with regard to perceptions about NAFTA.
Yee-kwong-Chan & Wong	1999	This study examines banks' competitive strategies and their relationship with performance in Hong Kong, a highly internationalized banking centre.	Results support Porter's three strategy typology; yet, cast doubt on his stuck-in-the-middle proposition by demonstrating that banks adopting a multi-strategic approach did outperform other strategically monotonous rivals. The RBV and the present empirical findings hint at the feasibility for well-resourced banks to combine apparently incompatible value creating activities in a synergistic way to achieve integrated flexibility and consequently, a sustainable multi-strategic position. It is suggested that this feasibility depends on a bank's organizing and coordinating capabilities that are developed and refined through managerial commitment, learning and experience, as well as a careful assessment of various organizational activities and its inter-relationships within the entire business system.
Young, Smith & Grimm	1997	The authors test Edward's (1955) mutual forbearance hypothesis and the Caves-Porter (1977) resource heterogeneity hypothesis with dynamic measures of firm-level rival behavior.	The results show that multi-market contact and resource heterogeneity can be related to firm level rival behavior, but that the relationships are more complex than theory suggests.

Table 53: Research Questions and Research Findings within Empirical RBT Studies – Research Area Business Policy and Strategy

Research Area: Entrepreneurship

Authors	Year	Research Questions	Findings
Birkinshaw, Hood & Jonsson	1998	The authors focus on how subsidiary companies are able to contribute to the firm-specific advantages of the MNC. They try to open the 'black box' of the subsidiary by discussing the various activities that occur within it, and the process that links them. By picking out one key activity (subsidiary initiative) they explore the factors associated with it in detail.	The results show that a multinational subsidiary can help create firm-specific advantage through combining their resources with initiative and an entrepreneurial subsidiary culture. This process is enabled by subsidiary autonomy and a lower level of local competition. Contrary, there is no relationship between specialized resources and a contributory role.
Chandler & Hanks	1994	This research presents a parsimonious model of venture performance that incorporates individual founder, firm and environmental characteristics. Specifically, it examines the moderating effect of founder competencies on venture performance in a sample of 155 manufacturing firms in north-western Pennsylvania.	The results support the authors' hypotheses, which indicate that individual level competencies moderate the relationships between the quality of the opportunity and firm performance and access to resource-based capabilities and firm performance.
Chrisman	1999	Using data from a national study of the Small Business Development Center program, the author tests two hypotheses derived from resource-based theory about the moderating influence of outsider assistance and geographic location on the relationship between entrepreneurial intentions and venture creation. The hypotheses suggest that outsider assistance leads to the development of tacit knowledge useful in start-up and that geographic locations differ in critical knowledge resources available to entrepreneurs.	Results indicate that, depending upon how start-up is measured, between 60 and 78 percent of individuals with entrepreneurial intent who received outsider assistance started a business as compared to 48 percent of the general population who indicated intent. Furthermore, significant regional differences were observed in start-up propensities as measured by Katz and Gartner's (1988) properties of boundary, resources, and exchange. Both findings suggest that resource-based theory can be applied to understanding why firms are started, as well as why firms succeed.
Dean, Turner & Bamford	1997	This study examines market and structural impediments to imitation as a partial explanation for new venture failure rates, using a resource-based approach.	The availability of niches, high sunk costs, high levels of unionization and high industry concentration appear to create industry environments which assist the post-entry new firm.
Greene	1997	The author analyzes the phenomenon of ethnic entrepreneurship using a resource-based approach focusing on community sponsorship as a sustained competitive advantage.	Results show that the creation process within the ethnic community is seen to be different from the process outside of ethnic communities due to the generation of a sustainable competitive advantage from sponsorship as community organized resources.
Bergmann-Lichtenstein & Brush	2001	Regarding new ventures, this study explores what kinds of resources are salient in new ventures and how resource bundles change over time.	Results identify the most common types of salient resources, the primary types of changes in resource and resource bundles, and a pattern linking the type of change with short-term performance results in each firm.

Research Area: Entrepreneurship

Authors	Year	Research Questions	Findings
Mosakowski	1993	This research applies a resource-based perspective to the question of how the focus and differentiation strategies affect the economic performance of entrepreneurial firms.	Results generally support the hypotheses that, when the focus and differentiation strategies are established, performance is higher than for other firms. The results fail to support the hypothesis that firm performance will decrease when these strategies are adopted.
Shenkar & Li	1999	This study addresses the question whether firms will seek knowledge complementary to their own or whether they will seek knowledge in the same area pertaining to their knowledge base.	The results assume that absorptive capacity is the principal mechanism governing the relationship between knowledge possession and knowledge search among prospective partners. The possession of complementary knowledge is a prerequisite for knowledge search, whereas firms seeking transfer of tacit, embedded knowledge choose equity joint ventures.
Wiklund & Shepherd	2003	The authors explore the impact of entrepreneurial strategic orientation (EO), analyzing whether a bundle of knowledge-based resources applicable to the discovery and exploitation of opportunities improves firm performance and if a firm's EO enhance the positive performance benefits of knowledge-based resources.	The authors' findings suggest that knowledge-based resources (applicable to discovery and exploitation of opportunities) are positively related to firm performance and that EO enhances this relationship.
Zahra, Hayton & Salvato	2004	Drawing upon the RBV, this study examines the association between four dimensions of organizational culture in family vs. non-family businesses and entrepreneurship.	Results show a nonlinear association between the cultural dimension of individualism and entrepreneurship. Further, there are positive linear relationships between entrepreneurship and an external orientation, an organizational cultural orientation toward decentralization, and a long- versus short-term orientation. With the exception of an external orientation, each of these dimensions is significantly more influential upon entrepreneurship in family firms when compared with non-family firms.

Table 54: Research Questions and Research Findings within Empirical RBT Studies – Research Area Entrepreneurship

Research Area: Human Resources

Authors	Year	Research Questions	Findings
Aryee	1994	Based on the RBV and using Singapore as a case study, this paper demonstrates how the government has actively influenced the development, allocation and utilization of its human resources to create and sustain competitive advantage in strategically selected industrial clusters.	The results imply that a societal self-interest as manifested in the social organization of careers or skills possessed by a nation's work-force is suggested as a critical factor in a nation's competitiveness in selected industrial clusters. The implications of linking career to a nation's competitiveness for careers research are discussed.
Athanassiou & Nigh	1999	This study examines the extent to which the density of the TMT's IB advice network is affected by the MNC's international strategy.	Results show that a firm's extent of internationalization and linkages across its host countries are positively related to the TMT's IB advice network density. This density is measured as the team members' demand for IB expertise and propensity to contribute to that expertise. There is idiosyncratic knowledge embedded in the TMT that is related to the internationalization process.
Bennett, Ketchen & Schultz	1998	The authors investigate the association of several conceptually antecedent strategic, organizational and environmental factors with the extent that human resource management is integrated with strategic decision-making processes across a large sample of organizations. They also examine the relationship between human resource management integration with strategic decision making and performance-related indicators.	The results show that the integration of the HR function with strategic decision making were to be associated with strategic type and whether or not top management views employees as strategic resources, but labor market munificence and organizational growth were not. Paradoxically, integration is associated with a lower evaluation of the HRM function by top management.
Bergh	2001	The author analyzes the influence of organizational tenure of executives on the retention and divestiture of acquired companies.	Results support RBV, i.e., the benefits of long organizational tenure (such as better understanding of the acquired firm), lead to more successful outcomes than the benefits of short organizational tenure. The findings do not support the argument that drawbacks of long organizational tenure (such as commitment to the strategic status quo and rigidity) are detrimental after uncertainty and disruption. The results further suggest that one reason for the high frequency of acquisition failure might be because of the retention (and departures) of the wrong acquired company top executives.
Boselie, Paauwe & Jansen	2001	The authors explore the relationship between HRM and firm performance.	Their results show that there are possibilities for including the institutional setting in theoretical frameworks in order to have a fuller coverage of the relationship between HRM and performance – a coverage which will do justice to the European setting for bringing about HRM policies and practices, which have a relationship with performance.

Research Area: Human Resources

Authors	Year	Research Questions	Findings
Boxall & Steeneveld	1999	This study reports one of the first industry-based, longitudinal investigations into the relationship between human resource strategy and competitive advantage.	Results indicate that the consultancy firms that survived the major business traumas of the late 1980s and early 1990s adopted similar structural, competitive, operational and HR responses associated with their evolving 'industry recipe'. It is suggested that opportunities do exist for professional service firms to develop industry leadership through superior HRM.
Chan, Shaffer & Snape	2004	The authors develop and test a dynamic model of co-specialized resources for competitive advantage. Using matched data from senior executives and human resource managers, they test the direct and interactive effects of high-performance human resource (HPHR) practices and organizational culture on firm performance.	Although the HPHR practices were not an important influence on performance, the findings indicate that organizational culture can be a valuable resource for companies.
Coff	2002	The author examines whether human capital and shared expertise predict that proposed acquisitions will actually close.	Results indicate that related expertise can mitigate hazards associated with human capital intensity; related expertise increases the probability that a given transaction will close. With targets that are not in human capital-intensive industries, related expertise is associated with impasses.
Daily, Certo & Dalton	2000	This study examines the relationships between CEO international experience, CEO tenure, firm internationalization, succession events, and firm performance.	Results show that international experience of CEOs interacts with the degree of internationalization as well as the CEO succession, and significantly explains the corporate financial performance.
Delaney & Huselid	1996	The authors analyze how HR practices influence perceptual firm performance measures.	Results imply that there is a positive relationship between HRM practices, e.g., training and staffing selectivity, and perceptual firm performance.
Delery & Doty	1996	The authors explore whether the three dominant modes of theorizing: 'universalistic', 'contingency', and 'configurational' perspectives are appropriate for strategic human resources.	Findings suggest a relatively strong support for a universalistic perspective (profit sharing, results-oriented appraisals, and employment security) and some support for both the contingency (participation, results-oriented appraisals, and internal career opportunities) and configurational perspectives (market-type employment). Organizations that adopt best HR practices can generate greater returns.
Fey, Bjorkman & Pavlovskaya	2000	Based on 101 foreign firms operating in Russia, the effect of human resource management (HRM) on firm performance in Russia is investigated. The authors accomplish this work by developing and testing a model including HR outcomes (motivation, retention and development) as a mediating variable between HRM practices and firm performance.	Results of the study provide some support for the use of HRM outcomes as a mediating variable between HRM practices and firm performance. They also indicate that non-technical training and high salaries will have a positive impact on HR outcomes for managers while job security is the most important predictor of HR outcomes for non-managerial employees. Thus, the study provides support for the importance of including managers and non-managers in the same study, but treating them separately.

Research Area: Human Resources

Authors	Year	Research Questions	Findings
Fields, Chan & Akhtar	2000	The authors investigate the extent to which contextual variables (such as size, location, ownership, competitive pressure, technological change, age, and growth) are related to HRM strategy in seventy-six private-sector firms located in Hong Kong. The analysis uses structural equations to examine the relationships among contextual variables and HRM strategy to develop and retain managers.	Results show that contextual variables have both direct and indirect effects on an organization's HRM strategy. The indirect effects occur through the top management involvement of the HR function within an organization. Use of a human capital development HRM strategy reduces organizational uncertainty about having an adequate supply of managers to meet firm objectives. Contrary to the expectation, in Hong Kong firms, greater reliance on internal development and promotion tends to increase uncertainty and greater competition tends to reduce training investment. Both of these unanticipated relationships may reflect the high mobility of managers peculiar to the Hong Kong labor market.
Galunic & Anderson	2000	This study examines the impact of firm specificity in human capital versus generalized investments in human capital on the organizational commitment of externalized workers (independent insurance agents for two insurance firms).	Results suggest that commitment levels can be significantly enhanced through generalized investments in human capital. Commitment vis-à-vis generalized investments could also be seen as an alternative way to generate 'rare' firm resources to the extent that those resources dedicate themselves to the firm and thereby making it less likely that their skill sets will be applied to other firms. Moreover, results also indicate that enhanced commitment is positively related with agent performance: committed and loyal employees are a valuable firm asset.
Gupta & Govindarajan	1984	The authors' research question focuses on how the linkage between managerial characteristics and SBU strategy affects SBU effectiveness at strategy implementation.	Results show that there are no consistent managerial characteristics, such as tolerance for ambiguity and willingness to take risk that would guarantee effective strategy implementation by SBUs.
Harel & Tzafrir	1999	This study explores whether there is a positive relationship between the use of specific HRM practice and the perceived improved performance of the organization. The authors also investigate if there is a positive combined organizational level effect by the HRM practices on the perceived performance of the organization.	Results show that the HRM practices of firms in Israel have a significant impact on both the perceived organizational performance (training has the most explanatory power) and market performance (training and employee selection practices had explanatory power).

Research Area: Human Resources

Authors	Year	Research Questions	Findings
Hatch & Dyer	2004	The authors seek to identify the sources of wide and persistent variations in learning performance in the semiconductor manufacturing industry. Concentrating on the RBV, they focus on human capital arguing that it contributes to competitive advantage due to its inimitability based on its intangible, firm-specific, and socially complex nature.	Consistent with this view, results show that investments in firm-specific human capital have a significant impact on learning and firm performance. More specifically, human capital selection (education requirements and screening) and development through training significantly improve learning by doing, which in turn improves performance. Yet, acquiring human capital with prior industry experience from external sources significantly reduces learning performance. Firms with higher turnover significantly under perform their rivals, revealing the time-compression diseconomies that protect firm-specific human capital from imitation.
Hitt, Bierman, Shimizu & Kochhar	2001	This study focuses on the direct and moderating effects of human capital on professional service firm performance.	Results show that human capital exhibits a curvilinear (U-shaped) effect and the leveraging of human capital a positive effect on performance. Moreover, the results show that human capital moderates the relationship between strategy and firm performance, thereby supporting a resource-strategy contingency fit. The results contribute to knowledge on the RBV and the strategic importance of human capital.
Huselid	1995	The author investigates the impact of HRM policies and practices on firm performance.	Results show that investments in high performance work practices (HPWP) are associated with lower employee turnover and greater productivity and corporate financial performance. However, despite the strong theoretical expectation that a fit between HPWP and competitive strategy would be reflected in financial performance, the results did not support the contention that fit has any incremental value over the main effects associated with the use of high performance work practices.
Huselid & Becker	1997	This study estimates the impact of a High Performance Work System and its effectiveness and alignment with firm competitive strategy on shareholder wealth.	Results show that a one standard deviation increase in these factors is associated with a $42,000 per employee increase in market value.
Huselid, Jackson & Schuler	1997	The authors explore the impact of HR managers' capabilities on HR management effectiveness and on corporate financial performance.	Results show that HR management effectiveness was associated with capabilities and attributes of the HR staff. HR management's effectiveness had a positive effect on productivity, cash flow, and market value.
Johnson	1999	The author develops an integrative taxonomy of intellectual capital that is to be used as aid mechanism in the appraisals of intellectual capital assets of firms.	Using a software firm as an example, results show potential quantitative and qualitative indicators of the stock of intellectual capital within the firm. Also, direction towards measuring flows as indicators of intellectual capital strength is discussed.

Research Area: Human Resources

Authors	Year	Research Questions	Findings
Khatri	2000	This study analyzes the link between strategy and human resource practices as well as the link between HR practices and firm performance.	Results, based on a sample of 200 of the largest companies representing all major industries in Singapore, indicate that organizational strategy affects HR practices and that the strategy-HR interaction accounts for more variation in firm performance than the main effect of HR.
King & Zeithaml	2003	The authors present a research protocol to identify a domain of organizational knowledge resources within industries. They employ research on resource-based theory and organizational epistemology to suggest a perceptual approach to measuring knowledge.	Using a sample of organizations from the hospital and textile industries, the authors interviewed CEOs to identify the feasible set of knowledge resources. They presented this set to managers at those organizations to measure their perceptions of the value-added of each knowledge resource for their organizations. The results demonstrate that the importance of knowledge resources varies by industry and organization, and calls to question efforts to generate an inventory of generic knowledge resources that is applicable across industries.
Koch & McGrath	1996	The authors survey mechanisms routinely used for discerning the number and types of employees needed, their hiring, and development fundamentally influence their productivity.	The results show positive and significant effects on labor productivity, especially in capital intensive firms that utilize more sophisticated human resource planning, recruitment, and selection strategies. The results thus support the contention offered by the RBV that investments in the development of an idiosyncratic human capital base are associated with a productivity pay-off. The effects of a firm's human resource strategy may be leveraged in a capital-intensive environment.
Lee & Miller	1999	This study focuses on how an organization's commitment to its employees' well-being (OCE) can aid in the profitable execution of its positioning strategies.	Results show that Porter's strategies (1980) of cost leadership, marketing differentiation, and innovative differentiation are found to be executed more effectively where organizations exhibit a high level of commitment to their employees in Korea. In an organization where one of Porter's strategies is employed, strong employee commitment has a direct effect on ROA.
McGaughey & Liesch	2002	This study recounts the tale of the Super League saga, providing a holistic analysis of the events and competitive issues arising by drawing on literatures concerning the economic nature and value of sports leagues, the RBV, and the nature of psychological contracts in changing environments.	The analysis confirms the general monopolistic tendencies of professional sports leagues in an increasingly global industry driven by the sports-media nexus, in accord with a number of comparable cases internationally.

Research Area: Human Resources

Authors	Year	Research Questions	Findings
Pennings, Lee & Witteloostuijn	1998	The authors work on the question on how human and social capital influence organizational dissolution in general and of their specificity.	Results show that the effects of human capital (firm tenure, industry experience, and graduate education) and social capital (professionals' ties to potential clients) on dissolution reveal that the absolute value of firm-level human and social capital has a negative effect on survival of Dutch accounting firms in the period between 1880 and 1990. The relative value (determined by uniqueness and non-appropriability) of firm-level human and social capital has a positive effect on firm survival. Human and social capital strongly predicted firm dissolution, and effects depended on their specificity (uniqueness) and non-appropriability (the ownership status of that capital). Findings suggest an integration of the RBV and organizational ecology.
Perry-Smith & Blum	2000	The authors focus on organizations with more extensive work-family policies and whether these organizations do have higher perceived firm-level performance.	Results from a national sample of 527 US firms suggest that organizations with more extensive work-family policies have higher perceived firm-level performance. In addition, there was partial support for the hypotheses that the relationship between work-family bundles and firm performance is stronger for older firms and firms employing larger proportions of women.
Richard	2000	This study analyzes how cultural (racial) diversity impacts organizational performance.	Racial diversity interacted with business strategy in determining firm performance was measured in three different ways: productivity, return on equity, and market performance. The results demonstrate that cultural diversity does, in fact, add value and, within the proper context, contributes to firm competitive advantage.
Richard & Johnson	2001	This study tests whether strategic human resource management (SHRM) effectiveness significantly affects organizational level outcomes. Using the RBV, this study examines the effective use of human capital on organizational performance.	Results show that SHRM effectiveness significantly reduces employee turnover and increases overall market performance assessment. However, SHRM effectiveness affected both firm productivity and return on equity only when moderated by capital intensity.
Roth	1995	This paper explores how a firm's international interdependence influences the pattern of CEO characteristics that enable a CEO to contribute to firm performance.	In data from 74 CEOs and their firms, the influence of locus of control, information evaluation style, and international experience on firm performance varied with interdependence. Marketing management specialization hindered performance in a high international interdependence context and helped it in a low interdependence context. Furthermore, an overall pattern of CEO characteristics consistent with hypothesized theoretical profiles had an important influence on firm performance.

Research Area: Human Resources

Authors	Year	Research Questions	Findings
De Saá-Pérez & García-Falcón	2004	The authors analyze the value of human resources (HR) for competitive advantage and their influence on firm performance in the service industry. The authors propose a resource-based framework to discuss the circumstances under which HR can be a source of competitive advantage. Also, they present an empirical research in the Spanish savings bank sector to analyze the relationship between HR management and firm performance.	The results suggest that those savings banks which better combine their HR practices to create and to develop a strategic human capital pool show better levels of profitability and productivity.
De Saá-Pérez & García-Falcón	2002	This study investigates the role of HR management in the development of organizational capabilities and its influence on the firm's performance based on the RBV.	The results from empirical research on a nation-wide sample of Spanish savings banks, suggest that human resource decisions, integrated in a human resource system, have an important influence on the development of organizational capabilities and on firm performance.
Schuler & MacMillan	1984	The authors explore how companies can strategically utilize infrastructure requirements to gain competitive advantage, particularly through their human resources and human resource management practices.	Results demonstrate that companies can create competitive advantage by aligning HRM practices to formulated strategy and helping their suppliers and distributors with their HRM practices.
Smith & Rupp	2002	The authors analyze the need for loyalty among knowledge workers, especially if a knowledge worker's knowledge and understanding is asymmetrically distributed and the worker is not perfectly mobile, then sustainable competitive advantage in an industry is attainable.	Human capital and preserving the human moment are the essential elements for sustainable competitive advantage.
Welbourne & Andrews	1996	This study explores the role of human resource management in enhancing the performance of initial public offering companies.	The results indicate that HR value and organization-based rewards predict initial investor reaction and long-term survival. The rewards variable negatively affects initial performance but positively affects survival.
Wright, MacMahan, McCormick & Sherman	1998	The authors examine how the types of strategies used and how the involvements of the HR executive impact managers' evaluations of the effectiveness of the HR function and of operating unit performance in petrochemical refineries.	Higher involvement of HR in firm strategy was strongly associated with the perception of HR effectiveness. This relationship was strongest when refineries pursued a product innovation strategy and viewed skilled employees as their core competence. HR involvement was unrelated to refinery performance, but it was negatively related when refineries emphasized efficient production as their core competence.

Research Area: Human Resources

Authors	Year	Research Questions	Findings
Youndt, Snell, Dean & Lepak	1996	The authors investigate whether the universal and contingency approaches to HR and performance are in a manufacturing environment necessarily incompatible.	Results show that a HR system focused on human capital enhancement was directly related to multiple dimensions of operational performance (i.e., employee productivity, machine efficiency, and customer alignment). However this main effect was due to the linking of human-capital enhancing HR systems with a quality manufacturing strategy as well as other manufacturing strategies.

Table 55: Research Questions and Research Findings within Empirical RBT Studies – Research Area Human Resources

Research Area: International Management

Authors	Year	Research Questions	Findings
Arora & Gambardella	1997	The authors analyze the distinctive role of market size, and how it conditions the competencies of the leading firms in an industry. Theory of imperfect competition implies that market size has a more important role when the performance is based on narrow, product-specific competencies, rather than generic competencies. The study tests this assertion by comparing the service industries that supplies engineering, and construction contracting to oil-refining and petrochemical plants in the US, Western Europe, and Japan.	Results suggest that market size is important even if there are no economies of scale. As long as firms differ in their competencies, and differences in firm competencies tend to persist, larger markets will have more efficient firms. This effect is more pronounced for firms with narrow, product-specific competencies.
Carr & Garcia	2003	This study investigates the strategic priorities arising from globalization as perceived by senior executives in eight MNC and nine independent vehicle component companies in Spain, and also as seen by customers.	Results confirm the difference in emphasis for local independent companies as opposed to MNCs. Surprisingly, there appears to be some shift of emphasis for both types of companies as globalization proceeds, stage by stage, highlighting the need for some dynamic perspective.
Delios & Beamish	1999	The authors survey whether there is value intrinsic to a wide geographic scope of operations. Also, they analyze if multinational firms are more profitable, whether there is a value in internationalization itself.	Results show that the geographic scope of Japanese firms was positively associated with firms' profitability, even when the competing effect of proprietary assets on firm performance was considered. Also, performance was not related to the extent of product diversification, although investment in rent-generating, proprietary assets was related to the extent of product diversification. Thus, performance was higher in more multinational firms and there is value in internationalization itself. Both effects – possession of proprietary technological assets (superior resources) and geographic scope – are positively related with performance.
Gimeno	1999	The author explores the outcomes of multi-market competition among US scheduled airlines when the interests and positions of the airlines differ in the mutually contested markets, emphasizing that sustainability may also be due to a lack of motivation to attack by would-be imitators or rivals.	Evidence from the airline industry suggests that airlines utilize their location in rivals' hub markets as a resource to reduce the competitive pressure from those rivals in their own hubs and thus to be able to sustain their dominant position in those markets.

Research Area: International Management

Authors	Year	Research Questions	Findings
Gupta & Govindarajan	2000	This study concentrates on knowledge flows that occur in multinational corporations (MNCs). The authors predict that (i) knowledge outflows from a subsidiary will be positively associated with value of the subsidiary's knowledge stock, its motivational disposition to share knowledge, and the richness of transmission channels, and (ii) knowledge inflows into a subsidiary will be positively associated with richness of transmission channels, motivational disposition to acquire knowledge, and the capacity to absorb the incoming knowledge.	Results confirm the positive effects of (i) the subsidiary's knowledge stock, its motivational disposition, and the richness of its transmission channels on the knowledge outflow from a subsidiary, and (ii) the richness of transmission channels, and the absorptive capacity of a division on the knowledge inflows to the subsidiary.
Hooley, Cox, Shipley, Fahy, Beracs & Kolos	1996	The authors examine the impact of foreign direct investment on the marketing resources and capabilities of firms in Hungary. This paper develops a theoretical explanation of host firm motives through RBT, proposing that host firms seek resources from their investors that can then be deployed to create competitive advantage over rivals in the domestic market.	Overall, the research strongly supports the major propositions: firms with foreign participation are much more likely to adopt a longer term set of objectives than the wholly domestically owned. Their priorities lie in building longer term market positions through focus on newly emerging markets, and building competitive advantages through superior quality offerings rather than lower prices. The proposition that firms with foreign participation would outperform those without was also strongly supported.
Jiang & Beamish	2004	This study examines one time-related attribute of the internationalization process at the subsidiary level, i.e. pace of timing subsequent foreign expansions and its performance implications. The authors analyze to what extent, and under what conditions, are the timing of the establishment of a subsequent subsidiary related to its performance and explore both the relationship between timing and performance of post-entry expansion and the contextual factors that influence this relationship.	The results of the empirical investigation contradicted the main relationship hypothesized. Looking for fast-mover advantages in foreign expansion, the authors found mostly fast-mover disadvantages instead. The results turned out to be consistent with the arguments from both the RBV and the organizational learning perspective.

Research Area: International Management

Authors	Year	Research Questions	Findings
Kotha, Rindova & Rothaermel	2001	This study explores firm-specific factors that are associated with the propensity of pure US-based Internet firms to enhance their international presence on the Internet by developing country-specific websites.	The results show, despite the assertion that all Internet firms are born global, that the pursuit of internationalization by Internet firms is related to the levels of their intangible assets and strategic activity. Two types of intangible assets (reputation and website traffic) are positively related to the degree of internationalization; so are the levels of competitive and cooperative activity, and the interaction effects between reputation and competitive and cooperative activity. These findings suggest that ideas from both resource-based theory and research on competitive dynamics can contribute to understanding the internationalization of Internet firms.
Luo & Peng	1999	The authors focus on whether organizational learning as measured by experience in a host country does affect international expansion performance, and if so, does such a relationship between experience and performance hold over time and how does the environmental forces in the host country affect such a relationship.	Based on a recent survey of 108 MNE subunits operating in China, the results show that the intensity and diversity of host country experience is an important predictor of subunit performance. While the positive effect of the intensity of experience on performance diminishes over time, the impact of the diversity of experience on performance remains unchanged. Moreover, for MNEs experiencing greater environmental dynamism, complexity, and hostility, there is a stronger positive relationship between experience and performance.

Table 56: Research Questions and Research Findings within Empirical RBT Studies – Research Area International Management

Research Area: Operations Management

Authors	Year	Research Questions	Findings
Hui	2004	This article seeks to apply the time-based process mapping technique at micro level in a resource-based firm. A compressed cycle time enables products to be manufactured more quickly and has the potential of locking in the most profitable customer.	Results show that a competitive forces analysis indicates that depleting supply, which is valuable, in an attractive industry affects considerably the time horizon of strategy formulation. Both the industrial organization and resource-based view are important to sustain business timeliness and operations management
Kogut & Zander	1993	This study tests the claim that firms specialize in the internal transfer of tacit knowledge by empirically examining the decision to transfer the capability to manufacture new products to wholly owned subsidiaries or to other parties.	Empirical results show that the less codifiable and the harder to teach is the technology, the more likely the transfer will be to wholly owned operations, implying that the choice of transfer mode is determined by the efficiency of the multinational corporation in transferring knowledge relative to other firms, not relative to an abstract market transaction.
Lewis	2000	The author explores the impact on the overall competitive positions of adopter firms using the term 'lean' in its core principles (flow, value, pull, minimizing waste etc.) that have become the paradigm for many manufacturing (and service) operations.	Based on three case studies and combining lean production and RBV literature, this study argues that lean production can underpin competitive advantage if the firm is able to appropriate the productivity savings it creates. Also, the ambiguity of lean production in practice means that the implementation process can create strategic resources to underpin SCA.
Mills, Platts & Bourne	2003	This paper aims to produce a justified, generic, pictorial architecture of the relationships between resources and competences within firms. Therefore, theory is refined and a linked resource and competence architecture is developed.	Results show that the architecture distinguishes between high-level competences that customers recognize and competences that support high-level competences but are less visible. An empirical example illustrates how the architecture enables the construction of structured pictures of connected competences and coordinated resources within a manufacturing firm.
Morita & Flynn	1997	The authors assess the comprehensive nature of manufacturing strategy, thereby focusing on the link between the use of best practices (e.g., building factor capabilities) and performance.	Their results show that there is a positive relationship between the use of best practices and performance, and that the strength of this relationship also suggests that the use of best practices must be considered as part of building factory capability as a prerequisite to the creation of competitive advantage through manufacturing strategy.
Pandza, Horsburgh, Gorton & Polajnar	2003	Based on the RBV and the dynamic-capabilities approach (DCA), this study argues that the structure of resources and capabilities are such that they present impediments to normative prescriptions for managers.	The authors contend that the real options framework is an appropriate heuristic for managing the process of capability development and a case study of a manufacturing operation is used to illustrate ideas.

Table 57: Research Questions and Research Findings within Empirical RBT Studies – Research Area Operations Management

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Afuah	2000	The author focuses on the impact of change on the capabilities of co-opetitors (suppliers, customers, and complementors) and argues that if a firm depends on its co-opetitor's capabilities, obsolescence on such capabilities can result in lower performance for the firm itself.	The results imply that post-technological change performance decreases with the extent to which the technological change renders a competitor's capabilities (suppliers, customers, and complementors) obsolete.
Barnett, Greve & Park	1994	This study analyzes the different determinants on performance in different firms, focusing on the firm's 'strategic position' and their 'competitive abilities' as two sources of advantage by using an evolutionary model and by inspecting the managers' decisions concerning the trade-off between both determinants.	Results show that banks in Illinois that are single units and were able to survive difficult competitive conditions in their history are able to enjoy higher levels of performance in their current competitive situation. The findings imply that each organization's performance today will depend on the historical path it followed in the past. Two organizations facing identical market conditions should perform quite differently if they have faced different degrees of types of competition in the past.
Barua, Konana, Whinston & Yin	2004	This paper addresses processes through which business value is created through Internet-enabled value chain activities. Relying on the resource-based view of the firm, the authors propose a model positing that a firm's abilities to coordinate and exploit firm resources (processes, information technology, and readiness of customers and suppliers) create online informational capabilities (a higher order resource) which then leads to improved operational and financial performance.	The model is tested with data from over 1,000 firms in the manufacturing, retail and wholesale sectors. The analysis suggests that while most firms are lagging in their supplier-side initiatives relative to the customer-side, supplier-side digitization has a strong positive impact on customer-side digitization, which, in turn, leads to better financial performance. Further, both customer and supplier readiness to engage in digital interactions are shown to be as important as a firm's internal digitization initiatives, implying that a firm's transformation-related decisions should include its customers' and suppliers' resources and incentives.
Berman, Down & Hill	2002	This study investigates a central tenet of the RBV that tacit knowledge often lays at the core of the sustainable competitive advantage.	Using data from the National Basketball Association, the authors find support for a predicted positive relationship between shared team experience and team performance that declines as shared experience grows, eventually becoming negative.
Brews & Hunt	1999	The authors analyze different types of planning that firms should utilize in their strategy formation behaviors.	Both formal planning and incrementalism form part of 'good' strategic planning, especially in unstable environments where planning capabilities are far better developed.
Brush & Artz	1999	The authors investigate the contingencies which define valuable resources in professional medical services.	Contingent combinations of firm-specific resources determine the performance of veterinary practices. The authors find evidence of performance benefits of client retention in a sample of 193 veterinary practices. They also find that in markets where competition from a new form of entrant is especially intense, an independent veterinarian's credence activities combine with its experience and search activities to jointly improve practice profitability.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Carmeli	2004	This study aims at introducing a framework by which scholars and practitioners may investigate a firm's profile of resources. The framework, labeled as 'Strategic Analysis Technique' (SAT), is an endeavor to better understand the firms' core resources (i.e., most valuable, rare, inimitable and non-substitutable) that generate SCA and lead to superior performance.	The resource profile of growing public firms in Israel was examined and compared with slow-growing firms. The results of this examination illustrated the framework. The study also sheds light on one of the most difficult challenges that resource-based strategists face - understanding the drivers of sustainable competitive advantage.
Carmeli	2001	Drawing on the RBV, this study analyzes the differences between high- and low-performance firms. The profiles of core intangible resources of high- and low-performance public firms were explored.	Results support the insight of a resource differential between high- and low-performance firms.
Carmeli & Tishler	2004	This study uses multivariate analysis to assess the basic question asked by resource-based view researchers: Do organizational resources and capabilities account for variations in firm performance?	An analysis of survey responses of 93 industrial enterprises in Israel indicates that superiority of an industrial enterprise, in terms of four performance measures, can be explained by a set of four core organizational resources and capabilities (managerial skills, organizational culture, organizational communication, and perceived organizational reputation). The results lend significant support to the premise of the RBV.
Carmeli & Tishler	2004	The present study aims to bridge this gap by examining the impact of a set of independent intangible organizational elements and the interactions among them on a set of objective organizational performance measures in a sample of local government authorities in Israel.	The results of a multivariate analysis indicate that organizational performance can be well explained by six intangible organizational elements (managerial capabilities, human capital, internal auditing, labor relations, organizational culture, and perceived organizational reputation) and the interactions among them, which need to be taken into account in any cost effective development.
Christiaanse & Venkatraman	2002	The authors' research work is about the relationship between IT and firm performance: they (1) develop a multidisciplinary view on expertise-based capabilities in inter-firm relationships and (2) develop and test a research model based on these insights.	The results show a marginal, yet positive support for the conventional theoretical ideas about the role of a dedicated, dominant inter-organizational system, and strong support for the role and effects of expertise exploitation capability.
Christmann	2000	Drawing on the RBV, this study analyzes whether complementary assets are required to gain cost advantage from implementing best practices, focusing on how factors internal to firms affect the relationship between environmental practices and competitiveness.	Results based on survey data from 88 chemical companies indicate that capabilities for process innovation and implementation are complementary assets that moderate the relationship between best practices and cost advantage, a significant factor in determining firm performance.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Collis	1991	The author identifies RBV's contribution to the understanding of global competition, broadly comparing this approach with the economic tradition of strategy.	Based on three case study examples, the results suggest that firm specific administrative heritage, core competencies, and implementation capabilities determine product market position and global competition in the bearing industry.
DeCarolis	2003	This study explores whether technological competence enhances firm performance and whether competitor imitation of firm knowledge does hurt performance.	Results indicate that imitability has a negative and significant impact on accounting and market-based performance measures. Thus, these findings provide strong evidence that a firm's competitive advantage can be diluted quickly as other firms draw from its technological knowledge. Contrary to expectations, technological competence is inversely related to market-based performance and positively related to accounting measures.
DeCarolis & Deeds	1999	This study tests the relationship between stocks (accumulated knowledge assets which are internal to the firm) and flows (knowledge streams into the firm) of organizational knowledge and firm performance in the biotechnology industry.	The results show that knowledge generation, accumulation and application may be the source of superior performance. Location, products in the pipeline, and firm citations are significant predictors of firm performance in the biotechnology industry.
Deephouse	2000	The author investigates whether media reputation is a strategic resource.	Theoretical and empirical analyses indicate that media reputation is valuable, rare, non-substitutable and imperfectly imitable.
Dhanaraj & Beamish	2003	This paper presents a comparative study of the export performance of U.S. and Canadian small and medium-sized exporters. A parsimonious model is developed drawing on the RBV, with three sets of resources, namely firm size, enterprise, and technological intensity.	Results show that the three key resources are good predictors of the export strategy of a firm. Export strategy is modeled as degree of internationalization, and its effect on the overall firm performance is studied using firm-level performance measures. The results confirm the validity of the model across the two data sets.
Douglas & Ryman	2003	The authors examine the drivers of competitive advantage within the hospital industry, focusing on both the direct and joint effects of market structure, firm-level competencies, and inter-organizational relationships on organizational performance.	The results of this approach indicate that managers, through their strategic actions related to the capabilities and relationships they develop and deploy, can establish advantageous competitive positions and influence the negative effects of market structure by developing important strategic competencies.
Dutta, Zbaracki & Bergen	2003	The authors argue that pricing is a capability, which can be used as a basis for competitive advantage. They claim that to develop the ability to set the right prices, a firm must invest in resources and routines. They base their argument on a study of the pricing process of a large Midwestern manufacturing firm.	The results show that pricing resources, routines, and skills may help or inhibit a firm in setting the right price, and hence in appropriating value created. The authors' view of pricing as a capability contributes to the RBV because it suggests that strategists should consider the portfolio of value creation and value appropriation capabilities a firm uses to create competitive advantage.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Fahy	2002	This study integrates perspectives from international business and strategic management to propose a resource-based model of global sustainable competitive advantage (GSCA). A series of hypotheses are presented on the nature of global resources and on the relationships between these resources and sustained superior performance. The model is tested on a sample of firms in the global automotive components industry.	The study provides a systematic framework for understanding the diverse and complex resource pool available to the global firm and the test of hypotheses derived from the model indicate relationships between the perceived importance of certain resources and levels of sustained superior performance.
Hall	1993	The author provides a framework of linking intangible resources to capabilities and to sustainable competitive advantage.	Results show that intangible resources most commonly identified as being a source of sustainable competitive advantage are: (1) company reputation, (2) product reputation, (3) employee know-how, (4) perception of quality standards, and (5) the ability to manage change.
Hall	1992	This paper provides a framework of intangible resources to create sustainable competitive advantage (SCA) and create capability differentials.	Based on a survey in the UK, executives verified that intangible resources (i.e. patents, licenses, reputation, and employee know-how of operations) lead to a firm's SCA and create capability differentials.
Hansen, Perry & Reese	2004	The authors argue that the apparent gap between the utility of the RBV as a practical tool and its utility as a theoretically sound explanation of competitive advantage can be most effectively narrowed by operationalizing the RBV in a way that is consistent with Penrose's (1959) original framework. Specifically, they suggest shifting the focus of RBV research away from the measurement of the value and/or amount of resources to the administrative decisions that managers make in the process of converting resources to services.	A Bayesian hierarchical modeling methodology is proposed because of the congruency between this methodology and the focus of the RBV on firm-level differences. Using longitudinal data the authors demonstrate how the RBV can be effectively operationalized with a Bayesian hierarchical model.
Hansen & Wernerfelt	1989	In this paper, the authors construct and test three models of firm performance, first an example from an economic perspective, second an example from an organizational perspective, and third, an integration of the two.	The results show that inter-firms variance in profit rates is regressed against industry and firm variables. Both sets of factors are roughly independent and firm factors explain about twice as much variance in profit rates as economic factors.
Hart & Banbury	1994	This paper first develops measures to identify firms with different levels and types of strategy-making process 'capability' then examines empirically their relationship to five dimensions of perceived performance.	Results indicate that firms with high process capability (the simultaneous use of multiple strategy-making process modes) outperform single-mode or less process-capable organizations.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Henderson & Cockburn	1994	This paper attempts to measure the importance of heterogeneous organizational competence (component and architectural competence) in competition in the context of pharmaceutical research.	Results show that the research productivity in different pharmaceutical firms depends mostly on differences in research strategy, in firm and program-specific resources, and in organizational capability. Moreover, the 'right' bundle allows firms to explore product development strategies that are not available to their competitors.
Hoopes & Postrel	1999	The authors examine the product development efforts of a scientific software company in order to explore the correlation between integrating practices and superior performance. They define the 'glitch' as a costly error possible only because knowledge was not shared, and measure the influence of glitches on firm performance.	Results show that gaps in shared knowledge due to lack of integration generate significant excess costs in product development efforts of a software company.
Ingram & Baum	1997	The authors investigate the influence of own experience and of two types of industry experience on the failure rates of US hotel chains.	The results of a study of US hotel chains finds that (a) firms benefit from their own experiences initially but are harmed in the long run, (b) specialist firms are more strongly affected by their own experiences than generalist firms, (c) firms benefit from their operating experience in an industry, accumulated both before and after the firm's entry to the market, and (d) an industry's competitive experiences influence the firm only after its entry to the industry.
King & Zeithaml	2001	The authors examine the relationship between firm performance and (1) causal ambiguity regarding the link between competencies and competitive advantage and (2) causally ambiguous characteristics of competencies.	Results show that causally ambiguous characteristics regarding key competencies were associated with higher firm performance. Low linkage ambiguity is associated with higher firm performance. Finally, the value added of inimitability is a function of the competitive advantage of the resource; the issue of imitation and transfer is moot if knowledge is not valuable within a competitive context.
Knez & Camerer	1994	The authors introduce a class of games to describe the informal, decentralized coordination which appears increasingly important in firms: the players' beliefs about how others act are a kind of 'expectational asset' that can enhance or inhibit productivity.	Results show that expectational assets are an interesting kind of resource which creates competitive advantage. Furthermore, the authors' findings indicate that smaller group sizes are more productive.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Knott	2003	Generally the isolating mechanism of routines is their tacitness. However, the existence of franchises, a market for organizational routines, poses a challenge to this RBV: the mere communicability of a superior routine (necessary for transfer to franchisees) should cause the routine to lose value. This paper examines the necessary and sufficient conditions of the RBV to find the weak link that leads to this paradox.	The results show that routines are indeed a valuable resource: total returns to franchised establishments were 50% higher than those to independent establishments. While isolating mechanisms exist, in this context they aren't really controlled by the 'resource-holders' (the franchisor and franchisee) but rather the mechanisms seem to be self-imposed by the would-be imitators. Thus, the paradox of explicit, yet valuable routines is resolved by demonstrating that tacitness is not necessary for routines to hold value and that hard work by the franchisor is necessary merely to extract the inherent value. Thus the isolating mechanism is not a property of the resource but a property of the management holding the resource.
Knott, Bryce & Posen	2003	This paper attempts to reconcile resource accumulation theory with the counterfactual evidence. The RBV holds that firms can earn supra-normal returns if and only if they have superior resources and those resources are protected by some form of isolating mechanism preventing their diffusion throughout industry. One isolating mechanism that has been proposed for intangible assets is their accumulation process.	The authors test the contribution of the intangible asset stock to the firm's final good-production function and examine the extent to which that asset stock deters rival mobility in the pharmaceutical industry. They find that the asset accumulation process itself cannot deter rivals, because asset stocks reach steady state rather quickly. Entrants can achieve an incumbent's intangible asset stock merely by matching its investment until steady state. Thus, they conclude that the accumulation process per se is not an isolating mechanism.
Kraatz & Zajac	2001	The authors address two different research questions: (i) Should one expect organizations richly endowed with historically valuable resources to be more, less, or equally likely (relative to their less well-endowed peers) to change strategies when confronted by environmental shifts? (i) Should one expect that such endowments will weaken, strengthen, or have no effect on the performance benefits associated with strategic adaptation, and what is the basis for this prediction?	Results indicate that organizations possessing greater stocks of historically valuable resources were much less likely to engage in adaptive strategic change, but also that this resource-driven disinclination towards change tended to have a benign or even beneficial effect on performance.
Maijoor & Witteloostuijn	1996	The authors explore whether strategic regulation is a major source of sustainable competitive advantage.	Results based on a longitudinal data set on the postwar history of the Dutch audit industry indicate that a key determinant of this history proves to be strategic regulation, which stimulates demand for audit services and protects rent-producing resources. Results imply that in the Dutch audit industry, the largest firms and their partners appropriated rents from human capital. The sustainability of these rents requires both product and factor markets to be imperfect.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Makadok	1999	This paper explores inter-firm differences in economies of scale and examines how they affect the subsequent evolution of the market share distribution in the money market mutual fund industry.	Money market mutual fund families with larger marginal returns to increasing their scale subsequently do gain market share at the expense of their competitors, but this effect diminishes over time, perhaps due to imitation. Inter-firm differences in production functions within an industry do exist, they do matter in a meaningful way in their effect on the distribution of market shares. Firms whose capabilities give them greater economies of scale than their competitors in the same industry subsequently gain market share at the expense of those competitors.
Makadok	1998	This study examines whether first-mover and early-mover advantages can be sustained in an industry where the barriers to entry are generally low and new product innovations can be easily imitated.	The results show that first-movers and early-movers in money market mutual fund industry enjoy both highly sustainable pricing advantage and a moderately sustainable market share advantage although the industry can be described as having low barriers to entry/imitation. In other words, although it lacks barriers to entry/imitation, it does have resource position barriers. The key resource is probably access to existing customers, or brand loyalty, or due to buyer uncertainty about alternatives.
Makhija	2003	This paper tests and compares the predictive ability of the RBV against the MBV under conditions of great change. The tested assumption is: when market conditions are in a state of flux, they expect the firm's resources to be the primary determinants of firm value.	The empirical findings show that RBV-driven variables are remarkably better at explaining share values of Czech firms in the period of privatization than MBV-driven variables. These results underscore the role of firm resources as a primary determinant of firm value in rapidly changing environments.
Markman, Espina & Phan	2004	This paper analyzes whether patents in the pharmaceutical industry can reflect a single resource that is (simultaneously) valuable, rare, inimitable, and non-substitutable, whether inimitability and non-substi-tutability can be measured, and their impact on performance.	Results indicate that once the effects of firm size, past performance and investment in innovation are held constant, inimitability is significantly related to firm profitability and new product introductions. Non-substitutability is significantly related to new product introductions only.
Mauri & Michaels	1998	The authors explore the firm and industry effects on core strategies as well as performance.	A variance component analysis of 264 single-business companies from 69 industries suggest that firm effects are more important than industry effects on firm performance, but not on core strategies such as technology and marketing.
McEvily & Zaheer	1999	The authors analyze differences in firms' abilities to acquire competitive capabilities. They propose that a firm's embeddedness in a network of ties is an important source of variation in the acquisition of competitive capabilities.	The results confirm that a firm's embeddedness in a network of ties is an important source of variation in the acquisition of competitive capabilities and thus, the need to revisit the implicit assumptions prevalent in the RBV that firms are atomistic and that capabilities are internally generated becomes evident. Sources of competitive capabilities can be embedded externally in firms' network resources.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
McGahan & Porter	1997	The authors examine the importance of year, industry, corporate-parent, and business-specific effects on the profitability of U.S. public corporations.	Their results indicate that year, industry, corporate-parent, and business-specific effects account for 2 persent, 19 percent, 4 percent, and 32 percent, respectively, of the aggregate variance in profitability.
McGrath, MacMillan & Venkataraman	1995	This paper is on the source of new advantages. Unless processes occur which lead to the reliable and repetitive achievement of desired outcomes at the business unit level, future competitive advantage for the firm cannot reasonably be contemplated.	Empirical results from 160 new initiatives in 40 organizations from 16 countries suggest that there are two important antecedents of competence and competitive advantage: the comprehension of the management team working on developing a competence and the deftness of their task execution. Findings support the idea that firms deploy characteristic patterns of process (or routines) which over time, might lead to enduring heterogeneity.
McGrath, Tsai, Venkataraman & MacMillan	1996	The authors argue that four antecedents are necessary precursors for a firm to capture rents from innovation, i.e., causal understanding, innovation team proficiency, emergence and mobilization of new competences, and creation of competitive advantages.	The results show that substantial support is found for the central theses, that achieving each of the four antecedent processes increases the predicted rents from an innovation project.
Miller	2003	This paper addresses the question how to develop sustainable advantage that is not at hand for firms but nonetheless attainable.	Results show that asymmetries are typically skills, processes, or assets a firm's competitors do not and cannot copy at a cost that affords economic rents. They are rare, inimitable, and non-substitutable, although not connected to any engine of value creation, and, in fact, often act as liabilities. By discovering and re-conceptualizing these asymmetries, embedding them within a complementary organizational design, and leveraging them across appropriate market opportunities, many firms were able to turn asymmetries into sustainable capabilities.
Miller & Shamsie	1996	The authors focus on how property-based and knowledge-based resources contribute to performance under different environmental conditions (stable and predictable vs. changing and unpredictable).	The results show that among major US film studios, property-based resources (in the form of long-term exclusive contracts with stars and theatres) helped performance in stable environments during 1930-50. In contrast, knowledge-based resources (production and coordinative talent and budgets) improved performance after the 1950s.
Moingeon, Ramanantsoa, Metais & Orton	1998	The authors argue that the creation and sustaining of a firm's competitive advantage must be heavily based on the dynamics of how the firm's resources are acquired and managed. Such a resource-based view leads into a study of the relationships between organizational learning and competitive advantage, and requires greater integration of strategies and organizational structure.	A case study of Salomon, a French manufacturer of outdoor sports equipment, is presented which illustrates very well how an analytical framework which integrates the concepts of competencies, organizational capabilities, organizational structure, and organizational learning, can explain this and similar firms' success.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Morris	1997	This research provides a theoretical justification for the link between a firm's environmental performance and competitive advantage, and tests the model empirically.	Findings for a sub-sample of 51 large firms support a strong negative relationship between the pollution that a firm releases and the firm's cost advantage.
O'Regan & Ghobadian	2004	This paper focuses on the RBV of strategy and in particular the role of generic organizational capabilities in the achievement of overall performance and competitive advantage.	Results confirm that generic organizational capabilities have a positive impact on strategy deployment and on the achievement of overall performance.
Peng & York	2001	Integrating transaction cost, agency, and resource-based theories, this study explores the determinants of export intermediary performance.	Survey results from 166 firms largely support that given the transaction cost constraints and principal-agent conflicts, export intermediaries' performance depends on their possession of valuable, unique, and hard-to-imitate resources which help minimize their clients' transaction and agency costs.
Pisano	1994	This study explores that where underlying scientific knowledge is sufficiently strong, effective learning may take place outside the final use environment in laboratories, i.e. learning-before-doing.	Results indicate that among pharmaceutical companies involved in either chemical-based or biotechnology-based process, there is no one best approach (learning-by-doing vs. learning-before-doing), but that it depends on the firm-specific knowledge environment. Deep knowledge of the effect of specific variables and their interactions increases the leverage of research and other forms of learning-before-doing. Learning-by-doing is required when organizations lack the underlying knowledge needed to simulate and predict effects 'off-line'.
Powell	1995	The author explores TQM as a potential source of competitive advantage, i.e., a strategic resource.	The results show that most TQM tools and techniques such as quality training, process improvement, and benchmarking do not generally produce competitive advantage, but certain tacit, behavioral, imperfectly-imitable features such as an open culture, employee empowerment, and executive commitment can be a source of competitive advantage. This result is consistent with the resource-based notion of complementary resources, and suggests that, rather than merely imitating TQM procedures, firms should focus their efforts on creating a culture within which these procedures can thrive.
Rao	1994	The author investigates the effects of social identity on the survival prospects of organizations. Reputation is a socially constructed entity which can be the outcome of legitimation processes, e.g., certification contests legitimate organizations and enable them to create favorable reputations.	Results indicate that firms' reputation is a socially constructed phenomenon that evolves over time. In the US auto industry, some firms were able to win 'legitimacy contests' and were able to obtain a 'head start' in building a reputation advantage, which improved their chances of survival. Reputation is an intangible resource that improves the survival of organizations.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Ray, Barney & Muhanna	2004	The authors propose the effectiveness of business processes as a way to test resource-based logic. This corresponds to an alternative class of dependent variable.	Results are consistent with resource-based expectations, and they show that distinctive advantages observable at the process level are not necessarily reflected in firm level performance. Intangible resources are positively related to customer service performance; tangible resources do not seem to explain variation in customer service performance.
Ruiz-Navarro	1998	This article suggests that a RBV is a key for the renewal of strategic thinking in mature industries. Firms can obtain advantages by analyzing and re-assessing information about the assets they already control, if these assets can be used to implement valuable market strategies and if similar assets are not controlled by a significant number of competitors.	The case study presented is a shipyard which redirected the technology and competencies previously employed in the military sector into profitable commercial applications.
Rumelt	1991	This study partitions the total variance in rate of return among FTC Line of Business reporting units into industry factors, time factors, factors associated with the corporate parent, and business-specific factors.	The results show that business-specific factors explain more variance in firm performance than industry membership does and that industry membership explains more than corporate parentage.
Santhanam & Hartono	2003	The objective of this paper is to test the robustness of the concept of IT capability and its relationship to firm performance and to identify critical issues in the application of RBV to examine the productivity paradox.	Results indicate that firms with superior IT capability indeed exhibit superior current and sustained firm performance when compared to average industry performance, even after adjusting for effects of prior firm performance.
Schoenecker & Cooper	1998	This paper analyzes factors that influence the timing of entry of firms into new industries based on new technology: firm resources and organizational attributes.	The results indicate that technological and marketing resources are to be associated with early entry. Also, early entry is predicted by organizational attributes such as commitment to a threatened market and firm size. Firms with higher technological, marketing, and financial resources will be first to enter industries with first mover opportunities.
Schroeder, Bates & Junttila	2002	The authors explore manufacturing strategy in the context of RBV by studying how manufacturing plants develop capabilities and resources in pursuit of better performance and competitive advantage.	Results show that the three distinct manufacturing resources and capabilities have the potential for creating a performance advantage. The capability of the plant to incorporate internal and external learning into proprietary processes and equipment emerges as an important contributor to manufacturing performance.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Segev, Raveh & Farjoun	1999	This study investigates whether highly ranked programs differ from other schools in the structure of their MBA programs.	Results imply that between the 25 leading business schools' MBA programs, the structure content is, in itself, not a source of superior performance as measured in the rankings. Each of the top five leading MBA programs in the US is located in a different cluster; therefore, there is an opportunity to excel in each of the identified clusters. Moreover, their findings do not allow speculating whether differences in performance are due to group-level resources or strategies or due to firm-specific resources and strategies. Since each of the schools is in a different group, they cannot infer that each top performer is so because of a different firm-specific reason.
Shamsie	2003	In spite of the growing interest in SCA, there has been little effort by strategy researchers to investigate market dominance. In this paper, the extent of dominance by leading firms is linked to the ability to develop and exploit their reputation as a key resource	Results from a wide spectrum of consumer product markets indicate that the advantages that stem from reputation are typically tied to specific industry characteristics. In particular, dominance is more likely to be observed in industries that offer consumer products that are purchased frequently and have lower prices.
Sharma & Vredenburg	1998	This paper examines the validity of the hypothesized linkages between environmental responsiveness strategies and the emergence of competitively valuable organizational capabilities.	The results show that strategies of proactive environmental responsiveness to deal with the uncertain environmental complications were associated with unique organizational capabilities that affect firm competitiveness.
Sherer, Rogovsky & Wright	1998	The authors investigate the motivation that drives the use of employment relationships in organizations that due to agency theory predictions should not have employees at all. The authors argue that the direct control present in employment links to several important firm (internal) capabilities and strategic (external) opportunities.	Findings show that organizations gain from having employment relationships and that integrating the agency theoretic argument with other theoretical arguments leads toward a resource-based view of strategy and human resources. In a taxicab firm, hourly employment gave the organization the capability to provide a reliable service under environmental uncertainty. Older organizations used significantly more employees, i.e., they used the direct control in employment to establish and maintain organizational routines for ensuring quality. Owner-drivers cooperate with one another in response to external competition, but turn rivalrous once their organization captured the market. To ensure internal cooperation, such organizations require revenue as well as cost sharing.
Spanos & Lioukas	2001	The authors propose a composite framework whereby both perspectives' causal logic as to the mechanisms of rent generation is explicitly modeled. Three distinct but also complementary 'classes' of effects on performance are identified: strategy, industry, and firm-assets effects.	Empirical findings suggest that industry and firm specific effects are both important but explain different dimensions of performance. Where industry forces influence market performance and profitability, firm assets act upon accomplishments in the market arena (i.e., market performance), and via the latter, to profitability.

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Tripsas	1997	This paper analyzes why incumbent firms sometimes fail drastically in the face of radical technological change yet other times survive and prosper.	Results show that the balance and interaction of three factors was shown to drive commercial performance of incumbents vs. new entrants in the typesetter industry in 1886-1990: investment, technical capabilities, and appropriability through specialized complementary assets.
Vincente-Lorente	2001	This paper examines the financial implications of some imperfections in resource markets: (a) analyzing the potential links between the strategic decision-making process and the firm's financial policy, (b) selecting and defining precisely the features of strategic resources able to explain the strategy-finance link, and (c) testing the propositions resulting from the discussion.	The results show that highly specific and opaque resources limit the borrowing capacity of the firm, while other transparent strategic assets affect financial leverage positively. There are unobservable costs that must be considered for a correct evaluation of a sustainable competitive advantage based on strategic resources; and the financial policy of a 'resource-driven' firm is partially determined by the features of its strategic resource bundle.
Wiggins & Ruefli	2002	The authors explore whether superior economic performance persists over time in a manner consistent with sustained competitive advantage (SCA).	Results from a sample of 6772 firms in 40 industries over 25 years show that (1) while some firms do exhibit superior economic performance, (2) only a very small minority do so, and (3) the phenomenon very rarely persists for long time frames. Thus, these results are most consonant with the RBV of the firm: persistent superior economic performance is found to exist but is also found to be rare, which is consistent with the concept of rare and valuable resources which lead to SCA.
De Oliveira-Wilk & Fensterseifer	2003	The study identifies resources and capabilities shared by clusters to formulate sustainable competitive strategies. The research method employed combined the techniques of cognitive mapping analysis with the theoretical basis of the RBV.	The analysis was developed for a wine cluster located in southern Brazil and analyzed beside the individual resources, those shared by the cluster as a whole. The results of the study produced a significant improvement in managers' and strategists' perceptions about the competitive potential of the cluster.
Yeoh & Roth	1999	The authors develop a model of the relationships among firm resources, firm capabilities, and sustained competitive advantage (SCA).	The results show that R&D and sales-force expenditures have indirect and direct effects, respectively, on SCA. The analysis suggests that SCA in the pharmaceutical industry requires firm strategies that capitalize on resources and capabilities. In particular, important resources are those that depend on scale imperatives (sales-force and R&D expenditures), are difficult to understand (development of therapeutically differentiated drugs), and in which the firm possesses a clear ownership and control (knowledge and understanding of drug development in certain therapeutically areas).

Research Area: Organization & Management Theory

Authors	Year	Research Questions	Findings
Zander & Kogut	1995	This study explores the determinants for speed of transfer and imitation of capabilities, and the relation of the dimensions of underlying knowledge.	Results indicate that the ease of codifying and communicating a manufacturing capability affect not only the time to its transfer, but also the time to imitation of the new product. The determinants of the time to imitation are found to be the extent to which knowledge of the manufacturing process are common among competitors and the degree of continuous recombination of capabilities leading to improvements of the product or the manufacturing process.

Table 58: Research Questions and Research Findings within Empirical RBT Studies – Research Area Organization & Management Theory

Research Area: Technology and Innovation Management

Authors	Year	Research Questions	Findings
Bates & Flynn	1995	This paper focuses on histories of firm innovations in manufacturing technology, assuming that these histories represent attempts to create unique resource configurations which will lead to competitive advantage.	Results show that innovation capability rests on accumulated expertise and skills. Findings suggest that there is a strategy of building resources through manufacturing innovation over an extended period of time.
Bharadwaj	2000	The author investigates the impact of IT as an organizational capability on firm performance.	Results indicate that firms with high IT capability tend to outperform a control sample of firms on a variety of profit and cost-based performance measures. By establishing the link between IT capacity and superior firm performance, the study serves to inform business managers that firms should do much more than merely invest in IT. They should identify ways to create a firm-wide IT capability.
Helfat	1997	This study analyzes the effect of the alteration of a firm's stock of knowledge in response to change(s) in the external environments: do such efforts depend on the firms' existing stocks of complementary know-how and other assets, and if so, how?	In response to rising oil prices, firms with larger amounts of complementary technological knowledge and physical assets also undertook larger amounts of R&D on coal conversion (a synthetic fuels process). Results show that dynamic capabilities enable firms to stay competitive through changing market conditions.
Klassen & Whybark	1999	The authors explore whether and under what conditions investments in environmental technologies offer both environmental and manufacturing performance benefits.	Results show that a significantly better manufacturing performance was observed in cases where management invested in the environmental technology portfolio and allocated resources toward pollution prevention technologies. Performance worsened as the proportion of pollution control technologies increased.

Research Area: Technology and Innovation Management

Authors	Year	Research Questions	Findings
Lewis	2002	This article explores practical and competitive aspects of the role that technology plays in service firms. A review of RBT leads to a conceptual model describing how technology can contribute to sustainable competitive advantage (SCA).	The propositions and corresponding data reveal a potential paradox implicit in the technology selection and implementation process. Namely that SCA is often based upon resources that emerge from conditions of uncertainty, ambiguity, and poor ex ante 'measurability', whereas these same conditions have a negative impact upon managerial control and therefore implementation success.
McEvily & Chakravarthy	2002	The authors concentrate on whether, and if so, how complexity, tacitness and specificity of a firm's knowledge do affect the persistence of its performance advantage.	The results show that complexity and tacitness of technological knowledge are useful for defending a firm's major product improvements from imitation, but not for protecting its minor improvements.
Powell & Dent-Micallef	1997	The authors analyze the linkages between IT and firm performance.	The findings show that IT alone has not produced sustainable performance advantages in the retail industry, but that some firms have gained advantages by using IT to leverage intangible, complementary human and business resources such as flexible culture, strategic planning IT integration and supplier relationships.
Schilling & Steensma	2002	This study investigates whether certain technological attributes do lead to a fear of opportunism, a desire for flexibility, or a quest for sustainable advantage. The authors aim at getting an insight into the underlying mechanisms driving decisions to firm boundaries while relying on the congruity of several conceptual antecedents of technological know-how across competing theories.	Results show that technological dynamism and barriers to imitation indirectly influence the governance mode decision by increasing the perceived threat of opportunism. Commercial uncertainty directly influences the governance mode and decreases the likelihood of an acquisition vis-à-vis a licensing agreement. Although uniqueness and barriers to imitation are also positively associated with the perceived potential for sustainable advantage, the potential of sustainable advantage had no direct effect on governance mode. In sum, the results imply that the RBV explains why a firm pursues particular resources rather than others, but TCE and an options perspective better explain the governance mode undertaken for accessing the resources once they are chosen.
Steensma & Corley	2001	The three research theories used to explain firm boundaries are TCE, ROP, and RBV. Their integrated model addresses the degree to which each of the three perspectives explains firm boundaries for technology sourcing is contingent on managerial risk taking, which is partly determined by organizational context.	Results suggest that management stockholdings, firm risk orientation, and slack resource availability moderate the extent to which the perceived threat of opportunism, the threat of commercial failure, and opportunity for sustainable advantage all influence firm boundaries.
Steensma & Fairbank	1999	This study examines a number of contingencies that may influence a firm's choice of governance mode for the procurement of external technical know-how.	Results indicate that the sourcing history of the firm and the technological context significantly influence the governance mode. The perceived imitability, uncertainty, and dynamisms of the technology appear to be particularly influential.

Research Area: Technology and Innovation Management

Authors	Year	Research Questions	Findings
Stuart & Podolny	1996	The authors propose a new network-analytic approach for identifying the evolution of firms' technological positions.	Results imply that the evolution of firms' technological positions is derived from firm-specific ability to innovative in particular technological subfields that partly shape their competitive success. The authors propose relational constructions of technological positions such that firms that have developed portfolios consisting of similar technologies are located near to one another. Firms' search behavior is locally bounded, and enables firms to be positioned and grouped according to the similarities in their innovative capabilities.
Sundbo	1996	Assuming that the empowerment of employees as corporate entrepreneurs in the innovation process and their control is important, this article tries to answer two questions: Do firms stimulate and balance innovation empowerment, and, if so, how do they organize and manage it?	Empirically, results showed that several Danish firms are consciously stimulating and balancing the empowerment. This balancing act can be described by a model of a dual organization structure: a loosely coupled interaction structure, which is an informal structure in which entrepreneurship thrives, and a management structure, which induces and controls free entrepreneurship.
Zahra & Nielsen	2002	This study examines the effect of a company's use of internal and external sources on multiple dimensions of successful technology commercialization (TC). The study also explores the moderating role of formal vs. informal integration mechanisms on these relationships.	The results show that internal human and technology-based manufacturing sources are positively associated with successful TC. Formal and informal integration mechanisms also significantly moderate the relationships observed between capability sources and TC, i.e. integration strengthens the contributions of the manufacturing sources to TC.

Table 59: Research Questions and Research Findings within Empirical RBT Studies – Research Area Technology and Innovation Management

(3) Coding Reports: Narrative Interview, Vote Counting, and Meta-Analysis

SUBJECT	CODING PROCEDURE
General Study Information:	
Study-ID	Number
Authors	Name
Year	Date
Publication Source	Journal-Name
Title	Article Title
Research Area	1 = Business Policy & Strategy 2 = Entrepreneurship 3 = Human Resources 4 = International Management 5 = Operations Management 6 = Organization & Management Theory 7 = Org. Communication & Information System 8 = Technology and Innovation Management
Specific Topic	1.1 = M&A Strategies 1.2 = Strategic Alliances 1.3 = Diversification and Portfolio Strategies 1.4 = Strategy Formulation and Implementation

SUBJECT	CODING PROCEDURE
	1.5 = Strategic Planning and Decision Processes 1.6 = Others 3.1 = CEO Topics 3.2 = TMT Topics 3.3 = HRM practices 3.4 = Human Capital 3.5 = Others 6.1 = Firm vs. Industry Effects 6.2 = Impact of Resources and Capabilities
Research Question	Description (Text)
Research Findings	Description (Text)
Other Theories besides RBT	Denotation (Name)
Research Design Information:	
Basic Type of Study	1 = Survey 2 = Case Study 3 = Experiment
Time Period	1 = Longitudinal 2 = Cross-sectional 3 = Both
Data Collection Methods	1 = Interviews 2 = Questionnaires 3 = Observation 4 = Expert panels 5 = Secondary data 6 = Others
Sample Size (N)	1 = 0-100 2 = 101-1,000 3 = >1,000
Sample Description	Description (Keywords)
Data Source	1 = Primary 2 = Secondary 3 = Both
Data Analysis Methods (Category)	1 = Traditional 2 = Specialized
Data Analysis Methods (Specification)	Denotation (Name)
Context Information:	
Industry Type	Denotation (Name)
Multiple vs. Single Industry	1 = Single 2 = Multiple 3 = No Specification
Industry / Environmental Effects (Category)	1 = Industry Dummy 2 = Environmental Dummy 3 = Competition (Industry Variable) 4 = Growth (Industry Variable) 5 = Concentration (Industry Variable) 6 = Complexity (Environmental Variable) 7 = Dynamism (Environmental Variable) 8 = Munificence (Environmental Variable)
Industry / Environmental Effects (Specification)	Measurement Description
Information Asymmetry	0 = No Assessment 1 = Statistically 2 = Argumentatively

SUBJECT	CODING PROCEDURE
Information Asymmetry Measurement	1 = Dynamism 2 = Complexity 3 = Industry Concentration 4 = Environmental Uncertainty 5 = Others
Information Asymmetry Condition	0 = No Specification 1 = Low 2 = High
Supply Inelasticity	0 = No Assessment 1 = Statistically 2 = Argumentatively
Supply Inelasticity Measurement	1 = Munificence 2 = Law Regulations 3 = Others
Supply Inelasticity Condition	0 = No Specification 1 = Low 2 = High
Dependent Variable Information:	
Dependent Variable (Specification)	Measurement Description
Data-Type	1 = Objective Data 2 = Subjective Data 3 = Both
Measure-Type	1 = Accounting Returns 2 = Stock Market 3 = Growth 4 = Hybrid Organizational Performance 5 = Operational Performance
Performance Condition	1 = Temporary 2 = Persistent
# of Performance Variables > 1	0 = No 1 = Yes
Dependent Variable Level (Category)	1 = Firm Level 2 = Lower Level 3 = Both
Dependent Variable Level (Sub-Category)	0 = None 1 = Operations Outcomes 2 = Service Outcomes 3 = Human Resource Outcomes 4 = Infrastructure Outcomes 5 = Technological Development Outcomes 6 = Logistics Outcomes
Dependent Variable Level (Specification)	Description
Acknowledge Measurement Complications	0 = none 1 = feedback loops 2 = retrospective bias 3 = others
Acknowledge Measurement Complications (Specification)	Description
Independent Variable Information:	
Independent Variable (Specification)	Measurement Description
Data-Type	1 = Proxy

SUBJECT	CODING PROCEDURE
	2 = Survey (Insider) 3 = Survey (Outsider) 4 = Survey (Both)
Resource Definition	Description
Resource-Type	1 = Tangible 2 = Intangible 3 = Resources in General
Resource-Category	0 = No Specific Category 1 = Physical Capital 2 = Financial Capital 3 = Routines 4 = Intangible Assets 5 = Capabilities 6 = Human Resources
Resource-Sub-Category	Description
Resource Bundle	0 = No Specification 1 = Discrete 2 = Systemic
Resource Conditions (for each VRIN)	1 = Statistically 2 = Argumentatively 3 = Both
Items (Specification)	Description
Reliability	Type and Value
Additional Information for Vote Counting:	
Expected Sign	1 = Positive 2 = Negative 3 = No Significant Effect
Found Sign Correlation	- = Not Reported 1 = Positive Significant 2 = Negative Significant 3 = No Significant Effect
Found Sign Model	- = Not Reported 1 = Positive Significant 2 = Negative Significant 3 = No Significant Effect
Additional Information for Meta-Analysis:	
Effect Size (Type)	- = Not Attainable 1 = Proportions 2 = Arithmetic Means 3 = Unstandardized Mean Gain 4 = Standardized Mean Gain 5 = Unstandardized Mean Difference 6 = Standardized Mean Difference 7 = Proportion Difference 8 = Odds-Ratio 9 = Pearson Correlation Coefficient 10 = Point-biserial Correlation Coefficient 11 = Phi Coefficient 12 = Regression Coefficient 13 = Standardized Discrim. Function Coefficient 14 = Manova Regression Coefficient 15 = Maximum Likelihood Estimates 16 = Canonical Correlation Coefficient 17 = Spearman Correlation
Effect Size (Value)	Value

SUBJECT	CODING PROCEDURE
Effect Size (p-Value)	- = Not Significant x = Not Attainable otherwise = 0.1 – 0.05 – 0.01 – 0.001
Effect Size (Page #)	Page Number
DV – Predictor Reliability (Type)	- = Proxy, No Construct 0 = Not Specified 1 = Parallel Forms (Coefficient of Equivalence) 2 = Internal Consistency or Corrected Split Half 3 = Test-retest (Coefficient of Stability) 4 = Inter-rater Reliability 5 = Cronbach's Alpha 6 = Internal Consistency 7 = Other (specify...)
DV – Predictor Reliability (Value)	Value
DV – Standard Deviation	Value
DV – Mean	Value
IDV – Criterion Reliability (Type)	- = Proxy, No Construct 0 = Not Specified 1 = Parallel Forms (Coefficient of Equivalence) 2 = Internal Consistency or Corrected Split Half 3 = Test-retest (Coefficient of Stability) 4 = Inter-rater Reliability 5 = Cronbach's Alpha 6 = Internal Consistency 7 = Other (specify...)
IDV – Criterion Reliability (Value)	Value
IDV – Standard Deviation	Value
IDV – Mean	Value
t-Value	Value
F-Value	Value
Sample Size (N)	Number
Test Period	Date

Table 60: Coding Report

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