## University of Twente Enschede - The Netherlands

School of Management and Governance University of Twente Enschede, The Netherlands

# **MASTERS THESIS**



Master of Science (MSc) in Business Administration (BA) Track: International Management (INT)



# CONQUERING THE NORTHERN VIRGINIA DATA CENTER MARKET

COLLABORATION BETWEEN THE WORLD'S LARGEST DATA CENTER PROVIDER AND THE WORLD'S LEADING COMMERCIAL REAL ESTATE COMPANY



DIGITAL REALTY TRUST

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#### Preface

This research is the final proof of competence for obtaining the Master of Science (MSc) degree in Business Administration (BA), with a specialization in International Management, from The University of Twente located in Enschede, The Netherlands. The research has been supervised by the University of Twente and was executed in the United States under the authority of CB Richard Ellis, Inc. (CBRE), the external principal. The research has been executed on site at the CBRE office location in McLean, Virginia, which is located in the greater Washington D.C. metropolitan area. The executed research focuses on a special technology niche in commercial real estate, the data center business. Within the data center business this research endeavor specifically analyzes the Northern Virginia data center market and the collaboration between CBRE and Digital Realty Trust, Inc. (DRT).

I would like to take this opportunity to express my gratitude to Mr. Faktorow, Executive Vice President at CBRE and company supervisor for this research. His willingness to offer me the opportunity to execute this research at CBRE is much obliged. Rob, many thanks for all you have taught me. You have invested time and money in me and have given me the confidence to succeed in this endeavor. Above all, thank you for being a great mentor and friend. I would also like to thank my two university supervisors, Dr.Ir. De Boer and Prof.Dr.Ir. De Bruijn for their continued and valuable support, professional guidance, and constructive feedback on improving the quality of this final research paper. A final thanks in this preface goes out to my family and girlfriend (Meike) who stood by me during the time I have lived abroad in Washington D.C. It has been a great personal adventure and experience, but not without your personal sacrifice. Thank you for your continued support and for visiting me in Washington D.C.

Washington D.C., the United States April 2010

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#### **Executive Summary**

The data center business is a relatively new, but rapidly growing niche within the technology and real estate industry. This research has analyzed the Northern Virginia data center market, which is one of the major data center markets in the world. It is characterized by a high demand for data center space, an abundance of fiber, advanced (technological) infrastructure, reliable and cheap power, and the presence of the U.S. federal government. In Northern Virginia Digital Realty Trust, Inc. (DRT) is one of the leading data center providers in terms of current data center supply and local development pipeline. DRT collaborates with CB Richard Ellis, Inc. (CBRE) in Northern Virginia, on the basis of an exclusive listing agreement. The goal of the collaboration is to find suitable tenants for DRT's available data center space and to outperform its direct data center competitors in Northern Virginia.

The research background has led to the formulation of the following research objectives:

- 1. To gain a thorough understanding of the company DRT and its data center business;
- To gain a thorough understanding of the Northern Virginia data center market and the local (and influential global) market trends and the expected developments in supply and demand of data center space within this market;
- 3. To gain a thorough understanding of the existing collaboration between DRT and CBRE on the Northern Virginia data center market; and
- 4. Provide strategic direction on how DRT can outperform its direct data center competitors on the Northern Virginia data center market.

In order to obtain the formulated research objectives, this research has developed a theoretical framework with the main research question being: 'How can DRT outperform its direct data center competitors on the Northern Virginia data center market?' The theoretical framework is based on a literature review and sets out a structure for executing this research. In addition a number of sub research questions have been raised, including:

- 'How attractive is the Northern Virginia data center market for DRT?'
- 'What is DRT's current strategy for serving the Northern Virginia data center market?'



- 'How does DRT collaborate with CBRE on the Northern Virginia data center market as part of this current strategy?'
- 'What are CBRE's strengths that can add value to DRT's data center business?'

The executed research can be categorized as an applied and descriptive research. It has relied on gathering secondary data from a number of different sources. The main secondary sources that have been used include: textbooks, articles, internal company documents (e.g. annual reports), market research reports, investor reports and supplementary information gathered on the internet. The secondary information is further supported by gathering primary information through: dialog with CBRE employees, discussions with DRT's employees and meetings with employees from other data center providers in Northern Virginia. For obtaining the research objectives and answering the research questions three analyses have been executed: an external analysis, an internal analysis and a current strategy analysis. The three individual analyses have led to a number of conclusions and strategic direction for DRT.

The research shows that Northern Virginia is an attractive data center market where both supply and demand of data center space are expected to grow through 2012. Demand, however, is expected to outgrow supply due to a number of identified macro trends and drivers of demand. For example, most data center providers in Northern Virginia have a limited local development pipeline, which results in a reduced growth of supply.

In Northern Virginia DRT competes with four data center providers that provide a similar data center product: Dupont Fabros Technology, Inc. (DFT), CoreSite, Power Loft and DBT Data. Only DRT and DFT currently have a local development pipeline of data center space and in order for DRT to expand its presence in Northern Virginia and outperform the company's direct data center providers, the external analysis has identified a number of specific opportunities that provide a focus for the company. Furthermore, the internal analysis shows that DRT has a number of unique characteristics and strengths that can be utilized to capitalize on the identified opportunities. In particular, the company's data center products, that are build according to the company's Pod Architecture<sup>®</sup>, provide a competitive advantage that can be further leveraged.

The current strategy analysis has analyzed DRT's current strategy and the collaboration with CBRE in Northern Virginia.

It shows how CBRE can add value to DRT's operations in Northern Virginia by leveraging the company's internal strengths and available resources. One of those resources includes the CBRE Technology Practice Group (TPG). The group's global reach, in-depth knowledge and expertise create a valuable asset.

Overall, it is concluded that the company's current strategy provides good alignment and strategic direction to benefit from the identified market dynamics and opportunities on the Northern Virginia data center market. In addition, this research has led to a number of recommendations for DRT:

- Maintain a high quality local data center development pipeline;
- Retain the company's current strategy and focus on obtaining the identified opportunities;
- Continuously monitor the identified threats that could affect the company's operations;
- Leverage the company's identified strengths to increase the company's footprint and outperform the direct competition;
- Utilize the collaboration with CB Richard Ellis, Inc., including the CBRE Technology Practice Group, to execute the company's strategy;
- Initiate a marketing campaign to increase more brand awareness in the marketplace;
- Continuously monitor the data center market dynamics to stay ahead of the local competition.



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#### List of Abbreviations

ADA	Americans with Disabilities Act
CBRE	CB Richard Ellis, Inc.
СЮ	Chief Information Officer
СТО	Chief Technology Officer
DFT	DuPont Fabros Technology, Inc.
DRT	Digital Realty Trust, Inc.
EMEA	Europe, Middle East and Africa
LEED	Leadership in Energy and Environmental
	Design
NYSE	New York Stock Exchange
PESTEL	Political, Economical, Social, Technological,
	Ecological and Legal
PSF	Professional Service Firm



REIT	Real Estate Investment Trust		
SWOT	Strengths, Weaknesses, Opportunities,		
	Threats		
TPG	Technology Practice Group		

#### 1. Research Design

#### 1.1 Research Background

This research is executed at the CBRE office in McLean, Virginia, one of CBRE's office locations within the United States. CBRE is the world's leading commercial real estate company in terms of turnover, market share and number of employees and is one of the two units of analysis in this research. Annex I provides a brief company overview. It addresses CBRE's market position, provided services, mission statement, corporate values, corporate objectives, competitive position and the company's competitive advantages.

The other unit of analysis in this research is Digital Realty Trust, Inc. (DRT). DRT is the world's largest data center provider in terms of the number of existing data centers and generated income from rent. Annex II provides a brief company overview of DRT. It addresses DRT's history, products and services, mission statement, global presence in key data center markets, customer groups, major current tenants and the company's financial situation.

This research focuses on the data center business, a technology and real estate business in which both CBRE and DRT are major global players. The global data center market started to develop in the late 1990s and experienced a rapid growth during the last several years. It is a relatively new niche within the technology and real estate industry and is considered to have a high growth potential in its supply and demand over the coming few years, something which is further explored in the coming chapters.

This research specifically focuses on the Northern Virginia data center market, because it is the data center market in which the CBRE office in McLean (from here on referred to as just CBRE) is involved and is also one of DRT's most income generating data center markets in the world.



DRT collaborates with CBRE on this market to benefit from the expected future growth in data center demand and to outperform its direct data center competitors. The collaboration started in 2007 and since that year the two companies have jointly executed a number of data center deals in Northern Virginia.

CBRE assists DRT, on the basis of an exclusive listing agreement, in finding suitable tenants for their available data center space in Northern Virginia.

CBRE also provides DRT with market intelligence that is for example related to the data center activity of DRT's direct data center competitors.

The goal for CBRE is to help DRT outperform its direct data center competitors on the Northern Virginia data center market by being a value-adding real estate advisor and strategic partner that provides DRT with strategic direction. In order for CBRE to achieve these goals it is imperative to obtain the research objectives that are formulated in the following section.

#### **1.2 Research Objectives**

- 1. To gain a thorough understanding of the company DRT and its data center business;
- To gain a thorough understanding of the Northern Virginia data center market and the local (and influential global) market trends and the expected developments in supply and demand of data center space within this market;
- To gain a thorough understanding of the existing collaboration between DRT and CBRE on the Northern Virginia data center market; and
- 4. Provide strategic direction on how DRT can outperform its direct data center competitors on the Northern Virginia data center market.

Obtaining the set research objectives enables CBRE to assist DRT in their pursuit to outperform its direct data center competitors on the Northern Virginia data center market.

#### 1.3 Research Question

Based on the given research situation and the set research objectives in the previous sections, the following main research question has been formulated:



'How can DRT outperform its direct data center competitors on the Northern Virginia data center market?'

In order to give a comprehensive answer to the main research question and obtain the set research objectives a number of sub research questions have been formulated:

'How attractive is the Northern Virginia data center market for DRT?'

'What is DRT's current strategy for serving the Northern Virginia data center market?'

'How does DRT collaborate with CBRE on the Northern Virginia data center market as part of the current strategy?'

#### 'What are CBRE's strengths that can add value to DRT's data center business?'

The sub research questions have been formulated for a number of reasons. The main reason is to support finding an answer to the main research question. In addition, some of the sub research questions have been formulated to contribute to obtain the research objectives of this research and some have been formulated for their practical relevance and value. The first sub research question is formulated to gain a thorough understanding of the Northern Virginia data center market and the expected developments on this market. The answer to this sub research question is also of practical relevance and value to DRT, because it will indicate whether it is meaningful or not to pursue the desire to outperform the company's direct data center competitors within this market. Should this research for example show that Northern Virginia is not an attractive market, DRT may want to consider to focus its resources on a different data center market. The second sub research question is formulated as part of the objective to gain a thorough understanding of the company DRT and its data center business. The company's current strategy is a vital component of its business and needs to be carefully analyzed to judge whether it is sufficient to realize the main objective of DRT: outperforming the company's direct data center competitors on the Northern Virginia data center market.



It is also important for CBRE to know what DRT's current strategy is since it is tasked to assist DRT in executing this strategy by being the company's strategic partner in Northern Virginia. Supplementary, sub research question three is formulated to obtain research objective three: to gain a thorough understanding of the existing collaboration between DRT and CBRE on the Northern Virginia data center market. The answer to that sub research question will provide important input for answering the main research question.

Finally, since CBRE is DRT's preferred strategic partner sub research question four is formulated to identify what CBRE's strengths are and how CBRE can add value to DRT's data center business in Northern Virginia. For DRT it is important to know how the company can leverage the inter-firm collaboration with CBRE in its pursuit to outperform its competitors. Chapter two will further illustrate how the sub research questions will be answered.

In order to execute the research and answer the research questions within a set time frame, the decision has been made by the researcher to focus on one particular market, the data center market in Northern Virginia. The choice for this market is a logical result of the research situation and locations of both the CBRE and DRT offices that are involved in this research. In addition, Northern Virginia is one of the largest data center markets in the United States and is one of DRT's main data center markets in the world. It is therefore considered to be a representative area for research.

Limiting the research scope to this specific market means that other data center markets are left out of the analysis, but at the same time it enables the researcher to thoroughly analyze this particular market.

It should be noted that, even though the majority of this research focuses on the Northern Virginia data center market, the systematic and strategic approach and the different research steps executed in this research are also applicable for analyzing other data center markets in either the United States or other parts of the world.

#### 1.4 Research Strategy

This research can be categorized as an applied and descriptive research. In order to reach the research objectives and give a cohesive answer to the main research question and sub research questions, a literature review is carried out.



The literature review provides a theoretical framework that is used as a basis for executing the research and is presented in the following chapter.

To identify relevant literature for creating a sound theoretical framework, the following search engines have been used: The online library of the University of Twente, PiCarta, Web of Science, Springerlink, Jstor, Pro Quest, Scirus, Scopus and Google Scholar.

The research is executed on the basis of the established theoretical framework and relies on gathering secondary data from a number of different sources.

The main advantage of using secondary data is its easy and quick accessibility and by using several different secondary sources the information can be justified which increases the reliability of the information. The main secondary sources that are used for this research include: textbooks, articles, internal company documents (e.g. annual reports), market research reports, investor reports and supplementary information gathered on the internet. The secondary information is further supported by gathering primary information through: dialog with CBRE employees, discussions with DRT's employees and meetings with employees from other data center providers in Northern Virginia. Overall the described research strategy and methodology can be labelled as qualitative research.



#### 2. Theoretical Framework

#### 2.1 Introduction

This chapter outlines the theoretical framework that is created to serve as a guideline for executing this research and enable the researcher to obtain the research objectives and answer the main research question and sub research questions. The main research question indicates a need for executing a strategic analysis that results in strategic direction that provides the answer to the question: 'How can DRT outperform its direct data center competitors on the Northern Virginia data center market?'

The theoretical framework that is outlined in this chapter is based on a literature search that provided input from a number of authors that have contributed to the field of strategic management. The mixture of input from the different authors provides a comprehensive framework for executing a strategic analysis that contributes to answering the main research question.

One group of authors, Boardman, Shapiro and Vining (2004), advocate that a strategic analysis should consist of three main analyses: the situational analysis, the fulcrum analysis and the solution analysis. The framework developed by Boardman et al. (2004) outlines a number of detailed and sequential research steps that enable a researcher to execute a comprehensive strategic analysis that can be used to solve a strategic issue. In addition to Boardman et al. (2004) there are a number of other authors that provide input for executing a strategic analysis, including: Porter (1980; 1985), Austin (1990) and Johnson, Scholes and Whittington (2008).

However, unlike Boardman et al. (2004), these authors do not provide a complete framework with detailed sequential research steps that can be used to execute a comprehensive strategic analysis. These authors, however, have developed or describe strategic tools that can be utilized as part of a strategic analysis. Therefore the decision is made by the researcher to use the framework of Boardman et al. (2004) as the generic framework for this particular research with, where believed to be appropriate and suitable, the use of additional strategic tools developed or described by the other authors.



Because the suitability of the generic framework, developed by Boardman et al. (2004), in its entirety cannot simply be assumed, the remainder of this chapter will critically review its suitability and applicability in relation to the research objectives, main research question and sub research questions of this research. Where believed to be necessary, research steps will be modified, omitted or replaced by strategic tools developed or described by other authors in the field of strategic management. Critically reviewing the framework will contribute to a comprehensive theoretical framework that will be used to execute this particular research.

#### 2.2 Situational Analysis

The situational analysis is the first part of the generic framework of Boardman et al. (2004). It provides a description and analysis of the current situation where the focal firm operates in. It analyzes the focal firm's external environment, its internal characteristics and its current strategy (Boardman et al., 2004). The focal firm in this research is DRT and executing an external analysis, internal analysis and current strategy analysis contributes to obtain the first three research objectives and is therefore adopted as part of the theoretical framework for executing this research. How the three individual analyses and their subsequent research steps contribute to obtain the first three research objectives.

#### 2.2.1 External Analysis

To obtain part of research objective one, which entails creating a thorough understanding of DRT's data center business, the external analysis as part of the theoretical framework for this research starts with an introduction to the data center business in general.

It provides a definition of a data center, addresses the high costs of building a data center and takes a closer look at the two main types of available data centers.

The external analysis will then analyze the focal firm's external environment as suggested by Boardman et al. (2004). In this research the external environment of the focal firm is the Northern Virginia data center market and analyzing this market contributes to obtain research objective two.



Even though a decision has been made to limit the scope of this research to the Northern Virginia data center market, the researcher believes that for analytical purposes it is valuable to place it in a global perspective. Therefore, the external analysis in this research briefly analyzes the global data center market in addition to analyzing the Northern Virginia data center market. The subjects that are believed to provide a good assessment of the global data center market are: the past and expected future market growth, current market trends and the key drivers of data center supply and demand. The rationale for choosing the described subjects is the direct influence they have on the Northern Virginia data center market and the analysis of that market.

Furthermore, to analyze a company's external environment Boardman et al. (2004) and Johnson et al. (2008) suggest using the five forces framework developed by Porter (1980). Porter's framework assesses the overall attractiveness of a market by analyzing five forces that shape industry competition. The five forces are: the threat of new entrants into the industry; the threat of substitute products or services; the bargaining power of buyers; the bargaining power of suppliers; and the extent of rivalry among existing competitors within the industry (Porter, 1980). Porter's five forces framework is shown in figure 2.1.



FIGURE 2.1: FIVE FORCES FRAMEWORK (PORTER, 1980)



Using Porter's five forces framework to analyze DRT's external environment, the Northern Virginia data center market, is adopted because it contributes to obtain research objective two. At the same time it provides an answer to the first sub research question: 'How attractive is the Northern Virginia data center market for DRT?'

As Porter (1980) notes, industries and specific markets can differ dramatically in their attractiveness and it is vital for firms to know their market in order to determine how successful they can be within that market. Porter's note is also applicable to DRT and finding an answer to this sub research question is vital for judging how successful DRT can be on the Northern Virginia data center market. Typically, a market is less attractive when most of the five forces are high (Porter, 1980).

As an addition to Porter's five forces framework, Austin (1990) suggests that the government's influence and actions should also be considered and added as a sixth force that influences the attractiveness of a market. Austin (1990) developed a modified framework for this, which is shown in figure 2.2.

FIGURE 2.2: INDUSTRY ANALYSIS FRAMEWORK (AUSTIN, 1990)



Austin (1990) labeled the force of the government as the 'mega-force', which can be powerful and can influence the overall industry structure and dynamics.



In addition, Austin (1990) adds four influential macro factors to Porter's original five forces framework. The four factors include: economic, political, cultural and demographic factors. They are similar to the factors in the PESTEL-framework (political, economical, social, technological, ecological and legal) developed by Johnson et al. (2008).

For the purpose of establishing a comprehensive theoretical framework, addressing the macro forces that have a direct influence on the Northern Virginia data center market is considered to be a valuable addition. They are discussed as part of Porter's five forces framework with the addition of Austin's sixth force, which is also believed to be a valuable addition to the theoretical framework.

Furthermore, Johnson et al. (2008) suggest that identifying opportunities and threats for a company in a particular market is another way to analyze the attractiveness of a market. Identifying opportunities and threats for DRT on the Northern Virginia data center market contributes to the overall assessment of the attractiveness of the Northern Virginia data center market and is therefore adopted as part of the theoretical framework.

#### 2.2.2 Internal Analysis

The internal analysis serves to analyze the focal firm's internal characteristics and identifies the existing and potential sources of competitive advantage (Boardman et al., 2004). Executing an internal analysis as part of this research contributes to obtain research objective one, analyzing the company DRT and its data center business.

Porter (1980, 1985) indicates that firms can create two main types of competitive advantage. The first one is achieving lower costs (cost advantage) and the second one is differentiation. The lower cost competitive advantage emphasizes the ability of a firm to design, produce and sell a product or service more efficiently than its competitors by trying to create cost advantages. Differentiation is defined as: 'the ability to provide unique and superior value to the buyer in terms of the product or service itself (i.e. design, quality), marketing approach, delivery system, or after- sales service' Porter (1980, 1985).

For pursuing a competitive advantage Porter (1980, 1985) identified three generic strategies: a cost leadership strategy, a differentiation strategy and a focus strategy. A cost leadership strategy aims to be the low cost producer in an industry for a given level of quality.



A differentiation strategy aims to develop a product or service that offers unique attributes that are valued by customers and are perceived to be better or different from the products of the competition. And the focus strategy concentrates on a narrow segment and within that segment attempts to achieve either a cost advantage or differentiation (Porter 1980; 1985). Which generic strategy is most suitable for a company and specific situation depends on the target scope as is shown in figure 2.3.



FIGURE 2.3: PORTER'S GENERIC STRATEGIES (1980, 1985)

As an addition to Porter's generic strategies, Annexes III and IV address two additional sources that can help a company to create a competitive advantage: relying on core competences and forming strategic alliances. Analyzing what the best strategy is for DRT to create a competitive advantage contributes to obtain research objective four and answer the main research question and is therefore adopted as part of the theoretical framework for executing this research.

Furthermore, Johnson et al. (2008) note that a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis is a useful tool to generate strategic options and assess the future course of action of a company. The SWOT analysis is a technique which is credited to Albert Humphrey (1969). It is a transparent planning instrument that can identify important problem areas for a company. It also enables a company to learn about the current situation and reflect on what can be done to improve the current situation (Sorensen, Vidal, & Engström, 2004).



The external analysis, as part of the theoretical framework for executing this research, analyzes the opportunities and threats for DRT on the Northern Virginia data center market. The internal analysis completes the SWOT analysis by analyzing DRT's strengths and weaknesses.

As a final part of the internal analysis and to further contribute to obtain research objective one, DRT's different data center products and the company's current and future supply on the Northern Virginia data center market are analyzed.

#### 2.2.3 Current Strategy Analysis

The third and final part of the situational analysis as described in the generic framework developed by Boardman et al. (2004) is the current strategy analysis. It analyzes the focal firm's current strategy for judging and taking advantage of the opportunities within a market. Annex V further elaborates on a firm's competitive strategy and how it can serve to take advantage of the opportunities within a market.

Executing a current strategy analysis for DRT is adopted as part of the theoretical framework for this research, because it contributes to obtain research objectives three and four. In addition, it provides answers to sub research questions two through four.

The second sub research question: 'What is DRT's current strategy for serving the Northern Virginia data center market?' indicates the need to thoroughly understand DRT's current strategy, which is a vital component for being able to give strategic direction to DRT later on in the research on how to outperform the company's direct data center competitors in Northern Virginia.

The third and fourth sub research questions: 'How does DRT collaborate with CBRE on the Northern Virginia data center market as part of the current strategy?' and 'What are CBRE's strengths that can add value to DRT's data center business?' deal with the existing professional relationship between DRT and CBRE that focuses on the Northern Virginia data center market. The professional relationship and collaboration between the two companies was a given fact before starting the research.

As part of the current strategy analysis it is believed to be valuable to analyze how CBRE, as a professional services firm (PSF), can add value to DRT's data center business, which



contributes to finding an answer to the main research question of this research. Supplementary, Annex VI provides an overview of the characteristics of a PSF like CBRE. Furthermore, the current strategy analysis can contribute to identify points of improvement for DRT and can provide input for giving DRT strategic direction on how to outperform its data center competitors on the Northern Virginia data center market.

#### 2.2.4 Conclusion

As a conclusion to this section, the three analyses that are part of the generic framework developed by Boardman et al. (2004) have all three been adopted for this research with a number of additional strategic tools developed or described by other authors. The three analyses are believed to contribute to a sound theoretical framework for obtaining the four research objectives and for answering the main and sub research questions of this research. Based on the output of the three individual analyses, a critical assessment can be made that results in strategic direction for DRT on how to outperform its direct data center competitors in Northern Virginia. According to the generic framework developed by Boardman et al. (2004), the critical assessment is part of the fulcrum analysis, which is addressed in the next section.

#### 2.3 Fulcrum Analysis

According to Boardman et al. (2004) the fulcrum analysis provides a situational assessment. It serves as a bridge between the situational analysis and the solution analysis and permits the researcher to summarize and assess the current strategy and performance of the focal firm. The idea of executing a critical assessment is adopted for this research because it provides a turning point between the three individual analyses and the strategic direction that is given by providing strategic direction to DRT.

As Boardman et al. (2004) note: a comprehensive situational analysis and an insightful fulcrum analysis provide a good picture of how the industry is changing, what competitors are doing, what opportunities are emerging, what the focal firm is capable of and, therefore, what strategic alternatives are reasonable and achievable.



#### 2.4 Solution Analysis

The solution analysis, as outlined in the framework of Boardman et al. (2004), provides strategic direction for the focal firm based on the output of the three individual analyses (situational analysis) and the output of the critical assessment (fulcrum analysis).

In addition, it can serve to recommend a future strategy, which in most cases turns out to be a refinement of the focal firm's current strategy (Boardman et al., 2004).

In this research strategic direction for DRT will be given in the final chapter, conclusions and recommendations. The strategic direction will be based on the output of the three individual analyses and the critical assessment and will contribute to answer the main research question of this research.

#### 2.5 Thesis Structure

Figure 2.4 displays the structure of this thesis, which is based on the theoretical framework as outlined in the previous sections of this chapter.







#### 3. External Analysis

As outlined in the theoretical framework, the external analysis provides an introduction to the data center business in general and explains some of its key concepts. The external analysis then provides an analysis of the global data center market before analyzing the Northern Virginia data center market and its attractiveness for DRT.

#### 3.1 The Data Center Business

Since this research is executed in the field of commercial real estate and, in particular, the field of data centers, it is important to have a clear understanding of what data centers exactly are.

A data center is a building that houses servers, as well as their accompanying network and storage hardware [1]. They can provide large amounts of electrical power and cooling capacity and require sufficient fire suppression and security systems. A major necessity for data centers is network access, which is typically provided through fiber [2].

In the past, companies with substantial data center requirements often owned their own data center facilities. These older data center facilities are often referred to as 'legacy' data centers, because they for example have limited power capacity or expansion possibilities. As a result, companies that own 'legacy data centers' often try to consolidate their data center infrastructure or outsource their 'mission critical needs' to external data center providers. One reason for outsourcing these needs is the fact that data centers are extremely expensive to construct. Companies do not want to utilize their own capital to build this capital-intensive infrastructure, which on average costs \$1,300 per square foot to build [3].

There are three factors that contribute to the expensive nature of data centers [4]:

- The required power systems. Data centers require expensive power systems, including backup generators, battery backups and power distribution units;
- The required cooling systems. Servers and other IT equipment inside a data center require a lot of cooling. This cooling is provided by chillers, cooling towers, air handlers and computer room air conditioners which are very expensive; and

The required computing support equipment. There are substantial costs involved in buying and installing servers, fire suppression systems, security equipment and the necessary cabling.

There are basically two types of data centers: wholesale and colocation data centers. The major difference between the two types of data centers is their size.

Wholesale data centers are typically sold in large pods (individual white-space rooms within a data center) that range in size from 10,000 to 40,000 square feet. Wholesale data center providers (including DRT) usually focus on leasing out large footprint and high power density data center space for the long-term (seven to ten years or longer) [5]. In most cases, wholesale data centers are owned by the data center providers, not by the tenants. The tenants of the wholesale data centers, however, manage their own infrastructure inside the data center independently. Since wholesale data center space is often sold in large pieces, wholesale data center providers typically have a small tenant base.

Colocation data centers on the contrary are smaller in size. Colocation data center space is mostly sold on the basis of individual racks or cages with a number of racks. These cages normally range from 500 to 5,000 square feet in size, which is a lot smaller than wholesale data centers<sup>1</sup>. Colocation data center providers often lease data center space from the larger wholesale data center providers and then offer their own, smaller-scale, data center space to smaller tenants. Colocation data center providers therefore often have a larger tenant base than the wholesale data center providers. In addition, the leases for colocation data center space tend to be shorter and rarely extend beyond two to three years [6]. Colocation data center providers to their tenants. These services can include: facility maintenance services, security services, remote hands services and network monitoring services. As a result of offering these additional services the price of colocation data center space tends to be higher than that of wholesale data center space.

Figure 3.1 shows the two types of data centers as discussed in this section.

<sup>&</sup>lt;sup>1</sup> The size range of data centers from 5,000 square feet (generally considered to be colocation) to 10,000 square feet (generally considered to be wholesale) is kind off an overlap area between wholesale and colocation.



#### FIGURE 3.1: WHOLESALE AND COLOCATION DATA CENTER TYPES



SOURCE: TIER1 RESEARCH 2009

#### 3.2 The Global Data Center Market

The analysis of the global data center market serves to put the analysis of the Northern Virginia data center market in perspective. It provides an overview of the major global data center markets, identifies drivers of data center demand and identifies macro data center market trends that are also expected to have an effect on the Northern Virginia data center market.

The global data center market consists of fourteen major data center markets [7] which are outlined in table 3.1.

North America	Europe	Asia-(Pacific)
Silicon Valley	London	Hong Kong
Los Angeles	Frankfurt	Токуо
Dallas	Amsterdam	Singapore
Chicago	Paris	Sydney
Northern Virginia		
New York/N. New Jersey		

TABLE 3.1: GLOBAL DATA CENTER MARKETS

SOURCE: TIER1 RESEARCH 2009



The fourteen major data center markets differ from other data center markets in the world in terms of their [8]:

- High local demand for data center space;
- High availability of power;
- High availability of fiber;
- ➢ High availability of internet exchange points<sup>2</sup>; and
- High population density.

Especially the high local demand for data center space in those markets is a key differentiator from other data center markets. The next section addresses the drivers of data center demand to create a better understanding of the reasons for that high local demand for data center space.

#### 3.2.1 Drivers of Data Center Demand

As shown in table 3.1, the Northern Virginia data center market is one of the fourteen major data center markets in the world. It can therefore be assumed that the following global drivers of data center demand will also influence the demand for data center space in Northern Virginia [9]:

- > The escalating corporate data storage requirements;
- > The increasing power that is required for new (electronic) equipment;
- The current aging of existing data centers ('legacy' data centers);
- The process of companies realizing that owning and operating data centers is not part of their core business, which results in increased data center outsourcing and leasing activities;
- The high construction costs for companies to build their own data center;
- The increasing power density of data center infrastructure (e.g. servers, new hardware, etc.);
- The increase in online gaming, e-commerce, trading and financial exchanges;

<sup>&</sup>lt;sup>2</sup> The physical infrastructure through which internet service providers exchange their internet traffic.



- The growing broadband penetration that increases the demand for rich media and interactive content;
- The increasing interest in/use of cloud- and network computing;
- The increasing online storage and history keeping;
- The developments and growth in telecommunications;
- The increasing number of social networking activities and online communities (e.g. Facebook, LinkedIn);
- The increasing reliance on the internet and the continued growing number of worldwide internet users;
- > The increasing demand for video streaming and podcasts (e.g. YouTube); and
- The changing social habits: online media versus print media, online video calling (e.g. Skype) versus regular calling, e-mail versus regular mail, and digital photos versus print photos.

The described drivers are increasing global demand for data center space, which is likely to outgrow the available supply of data center space. The next section addresses the expected future developments in global data center supply and demand.

#### 3.2.2 Global Data Center Supply and Demand

In order to give a judgment of the attractiveness of the Northern Virginia data center market later in this research, it is vital to understand the dynamics of the global data center market. Trends in global data center supply and demand are likely to be similar to the trends on the Northern Virginia data center market and are therefore analyzed in this section. Figure 3.2 shows an overview of the expected delta (change) in global data center supply and demand until 2012 [10].







SOURCE: TIER1 RESEARCH 2009

The predicted changes in data center supply and demand over the coming few years are further supported by trends in the global internet infrastructure market, a market closely related to the data center market. Table 3.2 provides an overview of the expected segment revenue (in millions of dollars) and segment growth of the global internet infrastructure market until 2012. It shows a similar growth trend as seen in the global data center supply and demand.

<b>ARKET</b>

SEGMENT REVENUE (SM)							
2008 2009 2010				2011		2012	
\$25,787.5	\$29	9,797.61 \$35,086.3		.3	\$42,079.6		\$50,450.3
SEGMENT GROWTH							
2008 2009 2010			201	1			
15.6% 17.7% 19.9%			19.9	9%			

SOURCE: TIER1 RESEARCH 2009



The final section of the global data center market overview analyzes additional data center market trends that are expected to occur on the macro level. The identified trends are also expected to influence and affect the dynamics, and in particular the demand for data center space, of the Northern Virginia data center market.

#### 3.2.3 Macro Data Center Market Trends

The following macro trends have been identified [11]:

- Many companies are expected, within the coming few years, to encounter data centers that are obsolete and/or radically underpowered. These companies are expected to need expansion data center space and backup data centers for disasterrecovery and business continuity purposes;
- The need for high amounts of connectivity and energy for power and cooling is expected to continue to rise with the ongoing migration to network computing. This is expected to stimulate information technology outsourcing;
- The desire of companies to have centralized storage of their information technology infrastructure is expected to continue to increase. As a result, a lot more data center consolidation in the future is expected to occur as companies try to optimize their data center supply and limit operating expenses;
- The current credit crunch is expected to have a slowing effect on data center construction<sup>3</sup>, which is expected to result in less growth in data center supply in the coming few years. The demand for data center space is not expected to be negatively influenced by the credit crunch, because data centers are 'mission critical needs' and often represent the backbone of a company. As a result the utilization rate of existing data center space is expected to go up, which is shown in figure 3.3.

<sup>&</sup>lt;sup>3</sup> Credit financing is a vital ingredient for data center construction.







- Growing demand and decreasing supply growth is expected to increase prices on the major data center markets around the world. Subject to the cost of power, this is expected to encourage companies to move their data center facilities to lessexpensive data center markets; and
- Due to a wide variance in power density of data centers, it is becoming a common practice to convert data center space to a cost-by-kW model to more accurately compare offerings from different data center providers.

#### 3.2.4 Conclusion

What can be concluded from the global data center market section is that Northern Virginia belongs to the fourteen major data center markets in the World. The world's major data center markets particularly distinguish themselves from other data center markets by the high local demand for data center space. The high demand for data center space is fed by a large number of drivers and macro trends that stimulate the demand. As a result the data center demand is expected to outgrow data center supply, which is expected to lead to a high utilization rate of currently available data center space.



#### 3.3 The Northern Virginia Data Center Market

The Northern Virginia data center market is one of DRT's main data center markets in the United States. The company collaborates with CBRE on this market to outperform its direct data center competitors. It is important for DRT and CBRE to have a thorough understanding of this market and its expected future developments. The following sections take a closer look at the supply, demand and utilization of data center space in Northern Virginia. Porter's five forces framework is used, with the addition of Austin's sixth force (the government as 'mega-force'), to analyze the attractiveness of this market. As a final part of the analysis of the Northern Virginia data center market, the opportunities and threats for DRT on this market are identified.

The Northern Virginia data center market is by data center activity the second largest data center market on the east coast of the United States, trailing only the size and scope of the New York metropolitan area. The market consists of approximately four million square feet of data center space and is particularly concentrated near Dulles International Airport. Reasons for the abundance of data center activity within this market include:

- Favorable geographic conditions;
- A development-friendly county government;
- Advanced (technological) infrastructure;
- A high concentration of businesses;
- Availability of reliable and cheap power;
- Abundance of fiber; and
- > The presence of the U.S. federal government.

#### 3.3.1 Data Center Supply and Demand

Figure 3.4 provides an overview of the expected delta (change) in data center supply and demand in Northern Virginia until 2012. It shows that demand for data center space in Northern Virginia is expected to outgrow supply, which is a favorable trend for DRT.





FIGURE 3.4: DATA CENTER SUPPLY AND DEMAND IN NORTHERN VIRGINIA

SOURCE: TIER1 RESEARCH 2009

One possible explanation for this trend is the global credit crunch. Because of the credit crunch there is a scarcity of available capital, which limits the amount of new data center space coming onto the Northern Virginia data center market. As a result, the utilization rate of existing data center space in Northern Virginia is expected to go up, which is shown in figure 3.5. This is a favorable trend for DRT, since it means that there will likely be a strong demand for DRT's available data center space within this market. Furthermore, if DRT is able to bring new data center supply to the market, it is likely to be absorbed within a short time frame.







#### 3.3.2 Porter's Five Forces Framework

Porter's five forces framework, with the addition of Austin's sixth force, is used to analyze the attractiveness of the Northern Virginia data center market. Based on the individual analyses of the six forces, which are discussed in annex VII, the following conclusion regarding the overall market attractiveness can be drawn.

As Porter (1980) notes: 'a market is less attractive when most of the five forces are considered to be high'. From the analysis of the six forces in annex VII can be concluded that on the Northern Virginia data center market both the bargaining power of buyers and the threat of substitute products and services are high. Both the rivalry among existing competitors and the influence of the government as 'mega-force' are of moderate strength. And finally, both the threat of new entrants and the bargaining power of suppliers are low. The final conclusion therefore is that, based on the analysis of the six forces, the Northern Virginia data center market is an attractive market.

To further analyze the attractiveness of the Northern Virginia data center market for DRT, the final two sections of this chapter analyze the opportunities and threats for DRT on this market.



#### 3.3.3 DRT's Opportunities

Based on the expected growth in data center demand in Northern Virginia, being able to quickly deliver supply in the coming years, creates a competitive advantage opportunity for data center providers. Especially in the face of a continued credit crunch, data center providers with substantial available capital like DRT are in a good position to capture a larger market share. Data center providers that are in desperate need of capital due to this credit crunch might have to dispose certain income producing assets, which creates an opportunity for DRT to acquire these assets and thereby expand the company's data center supply.

Another opportunity for DRT would be to acquire smaller wholesale data center providers like Power Loft or DBT Data if they are for sale or merge with larger wholesale data center providers like DFT or CoreSite in case there is a mutual interest to do this. Acquiring or merging with colocation data center providers or providers of managed services would be another possibility. By starting to offer colocation data center space and managed services to customers, supplementary to wholesale data center space, DRT could expand its current product- and customer base.

Another opportunity for DRT would be to work closer with the Northern Virginia brokerage community. Brokers can help locate suitable tenants for available data center space or can help with acquiring new data center facilities. Real estate professionals often have valuable relationships with real estate and information technology departments, something DRT could benefit from. DRT could also use brokers to help them identify and acquire 'off-market' deals, deals that are not publicly marketed. A great advantage of this is the absence of competitive bidding in the marketplace, which in most cases only leads to higher prices. Brokers could also help DRT target specific target groups. One opportunity is to target companies that own and operate legacy data centers. DRT could help these companies to migrate and modernize their data center facilities. Another major opportunity is presented by the U.S. federal government, who is predicted to spend five hundred billion dollars on information technology in the coming six years [32]. Becoming the government's lead data center provider could substantially grow DRT's data center business in Northern Virginia.


# 3.3.4 DRT's Threats

After having identified DRT's opportunities, this section identifies the threats [33] that can affect DRT's operations on the Northern Virginia data center market.

If data center supply in Northern Virginia, as expected, continues to grow in the future there might come a turning point where it starts to outgrow data center demand. As a result of that, rental rates may drop, which would make it harder for DRT to lease their vacant data center space.

Furthermore, a continuation of the current economic conditions, including increased market volatility and tight credit conditions could harm DRT's data center operations. A long-term recession would influence DRT's liquidity and financial conditions and would make it more challenging to get access to sufficient financial means to support future business expansions. Supplementary, a weakened Northern Virginia real estate market with declining real estate valuations and impairment charges would also threaten DRT's financial condition.

Another threat is formed by the fact that DRT relies heavily on major, high-profile tenants. The company's twenty largest tenants represent 57% of DRT's total annual income and almost half of DRT's data center properties are occupied by single tenants [34]. Losing one or more of the major or single tenants due to for example bankruptcy or insolvency could cause serious financial problems for the company. In addition, if the current or potentially new tenants desire services, for example managed services, that DRT does not provide, the company might lose the current tenants or not be able to secure the potentially new tenants for their data center space. Increasing demand for these additional services therefore forms a threat to DRT's future operations.

Yet another threat that lies beyond DRT's control is the influence that power companies can have on the company's data center operations. As mentioned in the analysis of Porter's five forces framework, Dominion Virginia Power is the sole power supplier for all existing data centers in Northern Virginia. If this company decides to raise its power prices this could have serious financial consequences for DRT's data center operations.

Finally, DRT faces the risk of having problems with construction or redevelopment of its data centers.



Some of the threats include: budget overruns, increased prices for raw materials or building supplies, construction site accidents, environmental issues, equipment problems and overall delays in construction [35]. In addition, natural disasters such as earthquakes, floods or fires could incur substantial costs that can threaten the company's financial condition.

### 3.3.5 Conclusion

After having analyzed the Northern Virginia data center market the following conclusions can be drawn. Northern Virginia has an abundance of data center activity due to a large number of favorable conditions and the supply and demand of data center space is only expected to go further up in the coming years. At the same time, the analysis of the six forces that influence the attractiveness of the Northern Virginia data center market confirms that it is an attractive market. In addition, a number of specific opportunities and threats have been identified for DRT that are related to this market. They are summarized in bullets below.

# **Opportunities**

- Opportunity to benefit from the expected growth in data center demand in Northern Virginia over the coming years;
- Opportunity to acquire income producing assets from competitors that are in financial trouble due to the financial crisis and credit crunch;
- Opportunity to acquire smaller wholesale data center providers in Northern Virginia like DBT Data or Power Loft;
- Opportunity to merge with larger wholesale data center providers like DFT or CoreSite;
- Opportunity to expand the company's current product and customer base by acquiring or merging with colocation data center providers or managed services providers;
- Opportunity to work closer with the brokerage community to leverage their experience and expertise and locate 'off-market' deals; and



• Opportunity to target the U.S. federal government who is expected to spend over five hundred billion dollars on information technology in the coming six years.

### <u>Threats</u>

- The threat of rental rates dropping in the future as a result of data center oversupply in Northern Virginia;
- The threat of a long-term recession that would influence DRT's liquidity and financial conditions and would make it harder to get access to sufficient financial means;
- The threat of a continuation of the current economic conditions, including increased market volatility and tight credit conditions that can threaten DRT's data center operations;
- The threat of a weakening Northern Virginia real estate market with declining real estate valuations and impairment charges that would affect DRT's financial condition;
- The threat of heavily relying on major tenants. DRT's twenty largest tenants represent 57% of the company's total annual income;
- The threat of a possible decline in wholesale data center demand in the future, for example caused by an increase of demand for colocation data center space or managed services;
- The threat of power companies increasing their power prices, which would lead to an increase in data center operating expenses;
- The threats of budget overruns, increased prices for raw materials or building supplies, construction site accidents, environmental issues, equipment problems and overall delays in construction; and
- The threat of natural disasters such as earthquakes, floods or fires, which could incur substantial costs and threaten DRT's financial condition.



# 4. Internal Analysis

The internal analysis analyzes, as outlined in the theoretical framework, DRT's different data center products, the company's current and future data center supply on the Northern Virginia data center market, and the company's strengths and weaknesses, which completes a SWOT analysis.

The main purpose of the internal analysis is to create a thorough understanding of the company DRT and its competitive advantages that can help the company to outperform its direct data center competitors on the Northern Virginia data center market.

# 4.1 DRT's Data Center Products

DRT offers three main wholesale data center products [36]: Turn-Key Data Centers®, Powered Base Buildings® and Build-To-Suit data centers. DRT's Turn-Key Data Centers® are ready to move-in data center centers with available power, cooling and security. DRT can deliver these data centers in twenty-six weeks or less. The typical customers for this type of data center are tenants that lack the expertise and capital to build their own data center. DRT's Powered Base Buildings<sup>®</sup> provide tenants only with a physical data center location and the required power and network access that is needed to support a data center. These buildings are specifically designed and suitable for tenants that have the ability to build-out and operate their own data center. The third and final data center option that DRT offers to its tenants is a Build-To-Suit data center, which meets specific and unique data center requirements that particular tenants may have. In addition, DRT provides 24/7 support for these data centers, which is guaranteed by the company's technical engineers and data center operations experts. DRT's data center supply on the Northern Virginia data center market consists of a mix of these three main wholesale data center products. All of DRT's wholesale data centers are built according to the company's Pod Architecture<sup>®</sup>. This architecture is a standardized data center design that uses standard power and cooling blocks, which creates cost-effectiveness, energy efficiency and design flexibility for future expansions [37].



Another advantage of this data center design is its short construction time of only six to eight months compared to a twenty-four months industry average. DRT's Pod Architecture<sup>®</sup> is shown in figure 4.1.



FIGURE 4.1: DRT'S POD ARCHITECTURE®

\_\_\_\_\_

The short construction time and 'speed to market' of DRT's data center products, which is how fast new data center supply can be brought to the market, is a competitive advantage on the Northern Virginia data center market. It is a competitive advantage because DRT's wholesale data center competitors in Northern Virginia are not able to deliver their data center products within the same construction time and 'speed to market'.

Figure 4.2 provides an overview of the five steps that are generally required to build a data center. It is used to further illustrate the discussed competitive advantage of DRT.

FIGURE 4.2: BUILDING A DATA CENTER

### Step 1: Site selection and acquisition

- Determining the data center requirements;
- Evaluating and selecting the appropriate site.



### Step 2: Design

- Incorporating the business application requirements into the building plan.

#### Step 3: Construction

- Permitting and licensing;
- Physical construction of the data center facility.

#### Step 4: Commissioning

- Testing the data center facility.

#### Step 5: Close-out

- Completing the data center facility and undertaking its operation.

SOURCE: DRT'S INTERNAL COMPANY DOCUMENTS

The average time needed to execute all five steps and build a data center is shown in figure 4.3.

### FIGURE 4.3: AVERAGE DATA CENTER CONSTRUCTION TIME



SOURCE: DRT'S INTERNAL COMPANY DOCUMENTS

As can be seen in figure 4.3, the average time that is required to build a data center is between 102 and 156 weeks. As indicated before, one of DRT's competitive advantages is the company's ability to build its three types of data center products within a much shorter construction time frame, which is shown in figure 4.4.







SOURCE: DRT'S INTERNAL COMPANY DOCUMENTS

As shown in figure 4.4, DRT's time frames for building the company's different data center products are substantially shorter than the 102-156 week average time frame for building a data center. DRT's shorter building time frames also reduce the risk of an investment that is made for a new data center, because during the construction time of a new data center economic conditions might change, which could limit the return on investment and could have serious financial consequences for an investor. A shorter construction time frame limits that risk. Furthermore, it significantly increases the 'speed to market', which in times of constrained data center supply is a great competitive advantage for a company. The next section, in accordance with the theoretical framework, analyzes DRT's current and expected future data center supply on the Northern Virginia data center market.



# 4.2 DRT's Data Center Supply

DRT's current data center supply on the Northern Virginia data center market is specified in table 4.1. It comprises of nine properties, thirteen buildings and 1,246,237 rentable square feet.

TABLE 4.1: DRT'S DATA CENTER SUPPLY IN NORTHERN VIRGINIA [38]

Data center location	Rentable square feet
43881 Devon Shafron Drive (Building B)	180,000 rentable square feet
in Ashburn, Virginia	
43831 Devon Shafron Drive (Building C)	117,071 rentable square feet
in Ashburn, Virginia	
43791 Devon Shafron Drive (Building D)	132,806 rentable square feet
in Ashburn, Virginia	
21561 and 21571 Beaumeade Circle	164,405 rentable square feet
in Ashburn, Virginia	
45901 and 45905 Nokes Boulevard	204,118 rentable square feet
in Sterling, Virginia	
44470 Chillum Place in Ashburn, Virginia	95,440 rentable square feet
21110 Ridgetop Circle in Sterling, Virginia	135,513 rentable square feet
1807 Michael Faraday Court	19,237 rentable square feet
in Reston, Virginia	
7505 Mason King Court	109,650 rentable square feet
in Manassas, Virginia	
251 Exchange Place in Herndon, Virginia	70,982 rentable square feet
8100 Boone Boulevard in Vienna, Virginia	17,015 rentable square feet
DRT's total current data center supply on	1,246,237 rentable square feet
the Northern Virginia data center market	



In addition to DRT's current data center supply, the company has one data center currently under construction on 2200 Shellhorn Road in Ashburn, Virginia. This wholesale data center, often referred to as 'Building A', has 138,600 rentable square feet. Furthermore, DRT's local development pipeline consists of two wholesale data centers that are planned to be built on 2200 Shellhorn Road in Ashburn, Virginia. One data center (Building E) will have 169,000 rentable square feet and the other data center (Building F) will have 100,000 rentable square feet. Additionally, DRT owns one vacant data center property in Virginia on 21551 Beaumeade Circle in Ashburn, Virginia. This property is capable of supporting up to 140,000 square feet of new data center market makes up for eight percent (8%) of the company's annual income in rent. This makes Northern Virginia the fifth largest data center market the company serves out of the twenty-seven metropolitan markets around the globe [39].

After having analyzed DRT's data center supply in Northern Virginia, the company's strengths and weaknesses will be identified to complete the SWOT analysis and internal analysis.

# 4.3 DRT's Strengths

As discussed in the section about DRT's data center products, one of DRT's main strengths is the company's ability to provide flexible data center products that have a short construction time frame compared to the competition in Northern Virginia. Being able to complete data center projects within a competitive time frame increases the company's reliability. An important strength that contributes to this is the design, construction and operational expertise of DRT's employees. Forty percent (40%) of all DRT's employees are information technology and real estate professionals with an extensive knowledge base. An additional strength is DRT's ability to retain this high percentage of professionals within the organization and attract new professionals when necessary [40]. The company also has an experienced and committed management team with an average of 24 years of experience in the technology and real estate industry.

Another strength is DRT's volume purchasing power, as earlier discussed in relation to negotiating global purchasing agreements with major suppliers of data center materials to achieve substantial cost savings.

Furthermore, DRT has a broad network of relationships with sellers of technology-related real estate in Northern Virginia, which enables DRT to quickly capitalize on particular acquisition opportunities in the marketplace once they present themselves.

As described in the previous section, DRT has a high-quality data center supply on the Northern Virginia data center market. The company's data centers are strategically located and house tenants that often have long-term leases in place, which provides DRT with stable future cash flows. DRT's data center portfolio is also quite diversified, since no single tenant accounts for more than eleven percent (11%) of the company's annual income through received rents. DRT is also a pioneer in building 'green' data centers. The company adheres to the standards of U.S. LEED, Leadership in Energy and Environmental Design, which is an internationally recognized green building certification system [41]. In addition, DRT is a contributing and voting member of The Green Grid, which is a global consortium of information technology companies seeking to improve energy efficiency in data centers and business computing ecosystems around the globe [42].

A final strength of DRT is its financial strength of ownership. The company has a strong balance sheet and managed to raise \$813.5 million of new capital in 2008, which gives DRT financial flexibility and timely access to capital if needed for future data center expansions in Northern Virginia. It also allows DRT to provide its tenants with financing options that make it easier for them to buy or lease the company's data center space.

# 4.4 DRT's Weaknesses

The final part of the internal analysis, analyzes DRT's weaknesses. In the past DRT solely relied on its internal sales channels and sales force to generate sales. Now DRT realizes that the brokerage community can add great value by helping them to find potential tenants or representatives of potential tenants that are interested in the company's data center space. It is therefore important for DRT to develop and maintain good relationships with the brokerage community in Northern Virginia. The company in Northern Virginia collaborates with CBRE, but this relationship is in its beginning stages and requires additional attention and efforts from DRT to make it more valuable and profitable in the long term. The current strategy analysis in the next chapter further elaborates on this collaboration.



Another weakness and point of attention is DRT's company culture and the perception tenants in the Northern Virginia marketplace have of DRT. Various players (e.g. brokers, tenants) on the Northern Virginia data center market acknowledge DRT's superior data center products and good after-sales service. However, these same players see the company's pre-sales services and communication as something that needs improvement. Potential tenants, for example, often have a hard time getting in contact with the right sales people at DRT. One possible explanation for this is the fact that DRT's internal sales force competes internally, which leads to a higher degree of organizational complexity and a lower degree of organizational transparency.

# 4.5 Conclusion

After having analyzed DRT's different data center products, the company's current and future data center supply on the Northern Virginia data center market and the company's strengths and weaknesses, the following conclusions can be drawn.

DRT builds three types of data centers that are built according to the company's Pod Architecture<sup>®</sup>, which is a standardized data center design. Because of that design DRT is able to build data centers in a shorter construction time than the average time needed to build a data center, which creates 'speed to market' and a strong competitive advantage. DRT's Pod Architecture<sup>®</sup> also creates cost-effectiveness, energy efficiency and design flexibility for future expansions. Additionally, DRT has a substantial data center supply on the Northern Virginia data center market and the company also has a positive local data center development pipeline, which is something that most of DRT's competitors in Northern Virginia do not have. The internal analysis was completed with a SWOT analysis that indentified DRT's strengths and weaknesses. The strengths and weaknesses are summarized in bullets below.

### <u>Strengths</u>

- The ability to provide three types of flexible data center products that have a short construction time frame;
- The ability to quickly deliver new data center supply to the market;



- Financial strength of ownership;
- The ability to retain a high percentage of professionals within the organization and attract new professionals when necessary;
- The presence of a committed management team with an average of 24 years of experience in the technology and real estate industry;
- The company's volume purchasing power, which is created by negotiated global purchasing agreements with major suppliers of data center materials;
- The presence of a broad network of relationships with sellers of technology-related real estate in Northern Virginia; and
- Being a pioneer in building 'green' data centers that comply with the standards of U.S. LEED.

### <u>Weaknesses</u>

- Relatively weak relationships with the brokerage community;
- Weak pre-sales services and communication with potential tenants;
- A relatively high degree of organizational complexity; and
- A relatively low degree of organizational transparency.



# 5. Current Strategy Analysis

As outlined in the theoretical framework, the current strategy analysis analyzes DRT's current strategy, the collaboration with CBRE, the CBRE Technology Practice Group (TPG) and CBRE's strengths and added value that can help DRT to outperform its competitors on the Northern Virginia data center market.

# 5.1 DRT's Current Strategy

DRT's current strategy is to target high-quality, strategically located data center properties that contain operations which are critical to the day-to-day processes of technology industry tenants and corporate enterprise data center users [43]. This strategy also applies to the Northern Virginia data center market and DRT continually looks for opportunities to add data center assets to its current supply.

Furthermore, the company specifically targets information technology departments of Fortune 2000 and financial services companies like investment banks, commercial banks, hedge funds and insurance companies, to find tenants for their available data center space.

As noted in the theoretical framework, Porter (1980, 1985) suggests that firms can create two main types of competitive advantage. The first one is achieving lower costs (cost leadership) and the second one is differentiation. For pursuing a competitive advantage, Porter (1980, 1985) identified three generic strategies: a cost leadership strategy, a differentiation strategy and a focus strategy.

DRT aims to create a competitive advantage through differentiation from its competition rather than offering the lowest price for wholesale data center space. The company tries to differentiate itself from its competition by providing state-of-the-art wholesale data centers that are built according to the company's unique Pod Architecture<sup>®</sup>. The strategy that DRT pursues is a differentiation strategy that focuses on product uniqueness and has a broad target scope. It is an industry-wide strategy that is not just limited to the Northern Virginia data center market.

As part of its current strategy DRT has adopted the following business objective: maximizing sustainable long-term growth in earnings, funds from operations and cash flow [44].



In order to achieve this business objective, DRT has developed a number of company-wide growth strategies [45]. They include:

- Focusing on data center supply accumulation in key North American and Western European hub markets, where demand outpaces usable data center supply;
- Targeting rapidly growing customer segments like finance, internet, technology, telecommunications, manufacturing and energy enterprises;
- Focusing on a marketing program that builds awareness, educates, and attracts customers to DRT's wholesale data center products;
- Accessing and using capital efficiently in order to maintain the company's financial strength;
- Building greater awareness of DRT's brand and better differentiating the company from its competitors; and
- Leveraging strong industry relationships with national and regional corporate enterprises that can help to identify companies with substantial technology and real estate needs.

As part of DRT's current strategy and in order to achieve the set growth strategies, DRT in Northern Virginia collaborates with CBRE.

# 5.2 DRT's Collaboration with CBRE

CBRE has the exclusive listing agreement for leasing DRT's available data center space in Northern Virginia. CBRE uses its brokerage services platform to market the available data center space to potential tenants or representatives of potential tenants. The two companies participate in bi-weekly conference calls and bi-weekly face-to-face meetings to discuss the Northern Virginia data center market and, particularly, the progress that has been made in finding tenants for DRT's available data center space within this market. Furthermore, CBRE organizes a semi-annual workshop for DRT during which the real estate professionals of CBRE inform DRT's senior leadership about the latest developments on the Northern Virginia data center market.



Subjects that are discussed include: the current supply and demand, the competition in Northern Virginia and recent data center deals that have been completed within this market. In essence, DRT utilizes CBRE's resources to track the Northern Virginia data center market and inform DRT about any information that could potentially impact DRT's operations on this market. One of CBRE's resources that play an important role in the inter-firm collaboration is the CBRE Technology Practice Group (TPG).

### 5.3 CBRE Technology Practice Group

The real estate professionals of CBRE that are involved in the inter-firm collaboration with DRT in Northern Virginia are part of the CBRE TPG. The CBRE TPG is an operational platform consisting of real estate professionals that aim to bridge the gap between the information technology, finance and real estate departments of companies [46]. The reason for addressing the CBRE TPG is the value it can add to the collaboration on the Northern Virginia data center market. One of the key strengths of the CBRE TPG is its strong global reach, with 75 members located throughout the world. Figure 5.1 provides an overview of the group's global reach.





### FIGURE 5.1: THE GLOBAL REACH OF THE CBRE TPG



SOURCE: CBRE'S INTERNAL COMPANY DOCUMENTS

The CBRE TPG is the largest specialty group of its kind within the commercial real estate industry and has the market-leading position throughout North America and Europe, the Middle East and Africa (EMEA) [47]. The group offers a wide array of value-added services, enabling CBRE real estate professionals to better assist potential tenants with their data center requirements. The group's in-house knowledge, services and expertise can be leveraged by CBRE in Northern Virginia to better assist DRT. Figure 5.2 provides an overview of the services provided by the CBRE TPG.







In addition to the provided services, the CBRE TPG has a number of other valuable tools that enable the CBRE real estate professionals to better understand the Northern Virginia data center market and better assist DRT in leasing their available data center space. The tools that are available include: a database with information on existing data centers, data center lease and sales comparables, competitor benchmarks, data center market research and a database of Chief Technology Officers (CTO's), Chief Information Officers (CIO's) and other information technology leaders of large companies. These last three groups are most often the decision makers in companies in relation to their data center requirements and transactions and are a great target as potential tenants for DRT's available data center space in Northern Virginia.

The main competitive advantage that is created through the CBRE TPG is the shared in-depth knowledge and expertise that is unmatched by any of CBRE's main competitors. In addition, CBRE has a number of other strengths and ways to add value to the collaboration with DRT in Northern Virginia.



### 5.4 CBRE's Strengths and Added Value

An important strength that can add value to the collaboration with DRT is CBRE's commitment of experienced senior leadership. Senior leadership brings experience to the negotiating table, which increases the likelihood of closing well-negotiated data center deals for DRT. In addition, CBRE has a proven track record of representative clients and globally executed data center deals. The company serves 88 of the Fortune 100 companies and serves 301 of the Fortune 500 companies in the world. In executing data center deals CBRE is able to rely on the company's geographic reach and extensive market intelligence, which is supported by the CBRE TPG. The company can leverage its extensive worldwide network of business relationships to get in contact with the decision makers of companies with data center requirements, which is an absolute necessity in order to execute data center deals.

### 5.5 Conclusion

After having analyzed DRT's current strategy, the collaboration with CBRE, the CBRE Technology Practice Group (TPG) and CBRE's strengths and added value that can help DRT to outperform its competitors on the Northern Virginia data center market, the following conclusions can be drawn.

The strategy that DRT pursues is a differentiation strategy that focuses on product uniqueness and has a broad target scope which is not just limited to the Northern Virginia data center market. In Northern Virginia DRT collaborates with CBRE to benefit from the identified strengths, resources, and value the company can add to DRT's data center business. The main advantages of the collaboration are:

- CBRE assists DRT in finding tenants for the company's available data center space in Northern Virginia;
- CBRE informs DRT about the latest developments on the Northern Virginia data center market including: the current supply and demand, the competition and recent data center deals that have been completed within this market; and
- CBRE leverages the TPG's global reach, in-depth knowledge, expertise and resources to assist DRT in finding suitable tenants and outperform its direct competitors.



# 6. Critical Assessment

After having executed the three individual analyses this chapter will provide a short summary and critical assessment of the current situation in which DRT operates its Northern Virginia data center business. The critical assessment will evaluate the current situation and will provide strategic direction to DRT with the aim to outperform the company's direct data center competitors on the Northern Virginia data center market. At the same time it will predict what will happen if the current strategy remains unchanged. Based on the critical assessment some actions will be addressed that have to be taken by DRT.

The three analyses executed in this research have analyzed DRT's external environment, internal situation and current strategy. The external analysis indicates a situation where data center demand in Northern Virginia is expected to grow substantially over the coming few years due to a number of identified drivers and macro trends. In addition, the demand is expected to outgrow the data center supply, which is a favorable trend for DRT because the company can reap the benefits of this trend by providing the market with new high quality data center supply. Supporting this analysis, the analysis of the market attractiveness of the Northern Virginia data center market also shows that it is an attractive market for DRT to operate in.

Furthermore, the external analysis has identified a number of opportunities for DRT that could enable DRT to grow its footprint and outperform its direct data center competitors on the Northern Virginia data center market. The opportunities are believed to be viable strategic alternatives for DRT, but they need further exploration before acting upon them. An example is the opportunity for DRT to acquire smaller data center providers in Northern Virginia, like DBT Data or Power Loft, which might not be a feasible option in case these companies are not for sale. Should this be the case that would eliminate the opportunity to pursue this option for DRT. Additionally, the external analysis shows for example that the U.S. federal government is predicted to spend five hundred billion dollars on information technology over the next six years, which presents a potentially valuable target group for DRT in Northern Virginia. This research has presented this opportunity, amongst other opportunities, but the final decision making on how DRT will attack this target group is a decision to be made by DRT's senior management.



The current situation, as analyzed in this research, also presents a number of threats on the Northern Virginia data center market. The identified threats could potentially affect DRT's data center operations and therefore request continuous monitoring by DRT's management. A possible future situation of data center oversupply would for example drop rental rates, which would harm DRT's financial situation. This particular threat requires DRT's management to closely monitor the supply and demand situation on the Northern Virginia data center market and calculate the risks of potential future oversupply. This research has identified the threats, but DRT's senior management is tasked with the continuous assessment of the severity of the threats for DRT's data center operations in Northern Virginia.

The internal analysis executed for this research shows that DRT is well equipped to capitalize on the opportunities identified in the external analysis. DRT's Pod Architecture<sup>®</sup> and different data center products, which have a shorter construction time than the industry average, provide the company with a competitive advantage. In addition, the internal analysis shows that DRT has the largest local development pipeline of data center supply in Northern Virginia. This enables the company to capitalize on the expected growth in data center demand in Northern Virginia. However, the Northern Virginia data center market dynamics could change over time and could result in potential oversupply, which would threaten DRT's data center operations. But this research shows that for the coming years there is likely to be more data center demand than supply. Additional research could identify exactly what companies in Northern Virginia are going to drive the data center demand over the coming years, which would enable DRT to try and become their preferred data center supplier.

The internal analysis has identified DRT's strengths and weaknesses. DRT's strengths can be leveraged to further expand its current data center footprint on the Northern Virginia data center market. Furthermore, the company's competitive strengths put DRT in a good position to outperform its direct competition. Especially the company's financial strength of ownership is an asset that can be used to further expand the company's data center presence in Northern Virginia. At the same time a number company weaknesses, which require additional attention from DRT's senior management, have been identified as part of the internal analysis.



This research shows that DRT has a lot more internal strengths than weaknesses, but this does not imply that the weaknesses do not require action to be improved.

Additionally, it would be a possibility to launch a marketing campaign to increase the awareness of DRT's brand in the Northern Virginia marketplace. Furthermore, in the company's pursuit of outperforming its direct data center competitors, it is important for data center users to view DRT as the leading data center provider when considering data center space in Northern Virginia. DRT's collaboration with CBRE, as analyzed as part of the current strategy analysis, can contribute to achieving this goal by leveraging CBRE's strengths, resources, knowledge and expertise related to this market. The CBRE technology Practice Group (TPG) is an operational platform that can be further utilized to fight the identified competition in Northern Virginia. Utilizing the group's in-house knowledge, services and expertise provides an additional competitive advantage over the company's competition. Supplementary, the CBRE TPG holds a number of tools that can be utilized to find suitable tenants for the company's available data center space in Northern Virginia. For example the available database with contact information of CTO's, CIO's and other information technology leaders of large companies in the U.S. is a valuable tool that can be leveraged by DRT in relation to its data center business in Northern Virginia.

Finally, the current strategy analysis shows that DRT's current strategy is suitable and effective to reap the benefits of the opportunities and market dynamics of the Northern Virginia data center market as identified in this research. DRT's differentiation strategy enables the company to provide data center users with cost-effective data centers that are built according to the company's unique Pod Architecture<sup>®</sup>. Especially the product uniqueness of DRT's data center products provides the company with a sustainable competitive advantage.



# 7. Conclusions and Recommendations

This final chapter addresses the main conclusions and provides an answer to the main research question. In addition, it reflects on: the achieved results in relation to the set research objectives, the suitability of the used theories and its limitations, and the overall process of this research endeavor. The chapter is finalized by providing recommendations for DRT and its data center operations on the Northern Virginia data center market as well as suggestions for future research.

### 7.1 Conclusions

This research has shown that Northern Virginia is an attractive data center market that is characterized by a high demand for data center space, which is caused by a number of reasons, including: an advanced (technological) infrastructure, a high concentration of businesses, the availability of reliable and cheap power, an abundance of fiber and the presence of the U.S. federal government and development-friendly counties. It is a market in which data center supply and demand are both expected to grow in the coming few years, but where the demand is expected to outgrow the supply. This research has justified the expected growth in data center demand by identifying a large number of drivers and macro trends that are expected to increase the data center demand. The main contributing factors include:

- An increasing number of companies wanting to outsource their data center facilities because they are obsolete, underpowered or do not have expansion possibilities;
- More companies want to consolidate and centralize their data center facilities to reduce operating expenses; and
- The increasing activity in online gaming, video streaming, social networking, telecommunications, online communities, cloud computing, e-commerce, trading and financial exchanges.

In addition to the supply and demand analysis, this research used Porter's five forces framework, with the addition of Austin's sixth force, to provide an assessment of the



attractiveness of the Northern Virginia data center market. The individual assessment of the six forces shows that the Northern Virginia data center market is an attractive market for DRT to compete in. The analysis also shows that Dupont Fabros Technology, Inc. (DFT) is DRT's strongest competitor in Northern Virginia in terms of current data center supply and current local data center development pipeline. The other three data center providers, CoreSite, Power Loft and DBT Data, form less of a risk to DRT due to their much smaller presence and lack of a local development pipeline.

The main research question of this research was formulated as follows:

'How can DRT outperform its direct data center competitors on the Northern Virginia data center market?'

This research has thoroughly analyzed the global and Northern Virginia data center markets and DRT as a company. The analysis of the global and Northern Virginia data center markets presents strategic insights for DRT, in collaboration with CBRE, that show how the data center market on both a global and local level is likely to change in the coming years. In addition, it provides a number of concrete opportunities that DRT should further investigate and pursue in the company's attempt to outperform its direct data center competitors. In order to capitalize on the expected growth in data center demand, DRT needs to provide sufficient new data center supply to the market and identify what companies will drive the demand. Most of DRT's competitors currently lack the financial resources to build new data center supply, which gives DRT a competitive advantage that should be further leveraged. Furthermore, DRT's strengths enable the company to capitalize on the identified opportunities and expand the company's footprint on the Northern Virginia data center market, which would make it harder for the smaller data center providers to survive. In addition, DRT needs to be wary of a number of threats that have been identified as part of this research. They need to be continuously monitored and acted upon if needed.

One of DRT's main differentiators from the established competition is DRT's collaboration with CBRE, which turns out to be beneficial to both parties. CBRE has the exclusive listing agreement for leasing DRT's available data center space in Northern Virginia. CBRE uses its brokerage services platform to find suitable tenants for DRT's available data center space in



Northern Virginia and provides DRT's senior leadership with continuous market updates. In addition, DRT leverages the following attributes of the CBRE Technology Practice Group (TPG): global reach, in-depth knowledge and strong expertise. Overall, after closely examining DRT's current strategy, it can be concluded that the company's current strategy provides good alignment and strategic direction to benefit from the identified market dynamics and opportunities on the Northern Virginia data center market.

### 7.2 Reflection

This section will reflect on the executed research in terms of the achievement of the research objectives, the suitability of the used theories and its limitations, and the overall process of this research endeavor.

The first point of reflection is the achievement of the set research objectives. The question to be asked is: 'has this research led to the achievement of the set research objectives?' The answer to that question is: yes, this research has led to the achievement of all four research objectives formulated as follows:

- 1. To gain a thorough understanding of the company DRT and its data center business;
- To gain a thorough understanding of the Northern Virginia data center market and the local (and influential global) market trends and the expected developments in supply and demand of data center space within this market;
- To gain a thorough understanding of the existing collaboration between DRT and CBRE on the Northern Virginia data center market; and
- 4. Provide strategic direction on how DRT can outperform its direct data center competitors on the Northern Virginia data center market.

In addition, this research has provided answers to the main research question and sub research questions as outlined in the research design and theoretical framework.

The second point of reflection addresses the theories that have been used to obtain the research objectives and answer the research questions. The question to be asked is: 'Did the researcher use the right theories for this particular research?' It is believed that the used theory enabled the researcher to obtain the research objectives and answers to the research questions, which was also the criteria for judging whether the theory was relevant or not as

part of the theoretical framework. However, since there is such an abundance of literature available that can support executing research, the researcher makes room for the possibility that the used theoretical framework is not exhaustive in its current entirety.

Furthermore, a number of limitations have to be addressed in relation to the used theory. This research has used a large number of secondary information resources. The reliability and validity of those resources has been assumed, but has not been tested as part of this research. Tier1 Research for example describes itself as an independent technology industry analyst company, but whether they are truly independent and whether their information is truly accurate has not been tested and cannot be completely guaranteed.

Additionally, this research used a number of documents that have been retrieved from the company websites of DRT and CBRE. Since both these companies are public companies they have to comply with the Sarbanes-Oxley Act and International Financial Reporting Standards, which increases the reliability and validity of the information. However, because a number of resources have not been checked in terms of their reliability and validity, this research is also limited in that regard.

Furthermore, since the data center business deals with highly sensitive information about companies, the information is often hard to obtain. The researcher has been limited by the information that was publicly available within the marketplace at the time of this research. Over time, this information is likely to be subject to change, which would limit the validity of this research.

Finally, this reflection section addresses the overall process of this research endeavor. The question to be asked is: 'What would the researcher do differently next time?'

Before this research started, the researcher had no prior knowledge about the data center business and technology side of commercial real estate. Even though this provided an exciting and interesting challenge, it made conducting this research more difficult due to the fact that valuable time was needed to gain an understanding of the basic concepts of the data center business.

Especially in the early stages of this research it has proven to cause difficulties related to the research design, which was also caused by the fact that there was no clear research goal and plan before going abroad to execute this research in the United States. The described issues could and should have been avoided by a more thorough preparation beforehand, preferably before going abroad.



### 7.3 Recommendations

The final section of this thesis provides recommendations for DRT and its data center operations in Northern Virginia as well as suggestions for future research.

Since the executed analyses show that the Northern Virginia data center market is an attractive market where data center demand is expected to outgrow data center supply in the coming few years, DRT needs to make sure it has enough high quality data center space available for lease. It is therefore recommended to make sure that the company's local development pipeline is filled for the coming few years. Furthermore, it is recommended to retain the company's current strategy with a refinement of focusing on obtaining the identified opportunities. It is also recommended to continuously monitor the identified threats that could affect the company's operations. In addition, DRT has a large number of strengths that should be leveraged to increase the company's footprint and outperform the company's direct data center providers in Northern Virginia. As part of this, DRT should utilize the collaboration with CBRE, including the CBRE Technology Practice Group (TPG) and its resources, to execute the company's competitive strategy. At the same time it is recommended for DRT to work on improving its weaknesses as identified in this research and to initiate a marketing campaign to increase more brand awareness in the marketplace. A final recommendation is to continuously monitor the data center market dynamics to stay ahead of the local competition and future research should focus on this over a longer time span. It should also focus on the indirect competition from colocation and managed services providers, which has been left out of the analyses of this research.

In an attempt to further validate the research findings of this research endeavor, future research could adopt this research framework and add additional research methods based on the available time frame.

A final suggestion for future research is to investigate the decision making process of large corporations with data center needs, which would provide a understanding that could contribute to win more future data center business.



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# Annexes

### Annex I: CB Richard Ellis, Inc. Company Overview [48]

CBRE is the world's largest real estate services provider serving real estate owners, investors and occupiers. The company is headquartered in Los Angeles and has over 30.000 employees in more than 450 offices (including affiliate companies) operating in over 60 countries. Annex figure 1 provides an overview of CBRE's worldwide office locations.

ANNEX FIGURE 1: CBRE'S WORLDWIDE OFFICE LOCATIONS



SOURCE: CBRE'S INTERNAL COMPANY DOCUMENTS

CBRE is a Fortune 500 and S&P 500 company and is listed on the New York Stock Exchange since 2004 (NYSE: CBG). CBRE's revenue totaled \$5.1 billion in 2008 and the company serves 88 of the Fortune 100 companies and 301 of the Fortune 500 companies in the world.



CBRE offers a wide spectrum of commercial real estate services to its clients. Some of its services include tenant representation and agency brokerage, investment property services, consulting, valuation and advisory services, mortgage financing and investment management services. Annex figure 2 provides an overview of CBRE's different service lines.

ANNEX FIGURE 2: CBRE'S DIFFERENT SERVICE LINES



SOURCE: CBRE'S INTERNAL COMPANY DOCUMENTS

CBRE's overall mission statement is to deliver superior results for stakeholders by:

- Always putting the client first;
- Tailoring the company's services to the client's requirements;
- Collaborating across markets and service lines;
- Thinking innovatively, but acting practically;
- Helping the client to make the most informed business decisions;
- Delivering results; and
- Providing a rewarding work environment for its employees.

To enhance client service, CBRE maintains partnerships, joint ventures and alliances that supplement its market coverage.



These selected firms are part of the so-called CBRE Affiliate Program and are also displayed in the overview of CBRE's worldwide office locations in the beginning of this annex.

CBRE has adopted the following corporate values on which they build their business:

ANNEX FIGURE 3: CBRE'S CORPORATE VALUES



SOURCE: CBRE'S INTERNAL COMPANY DOCUMENTS

#### Respect

Treat everyone with dignity, value their contributions, and help one another succeed.

**Integrity** 

Uphold the highest ethical standards in its business practices.

<u>Service</u>

Dedicate employees to making a meaningful impact with clients and in the company's communities.

**Excellence** 

Aspire to be the best in everything the company does and drive for continuous

improvement.

In 2008 the company had the following corporate objectives:

- Establish and maintain the leading position in every major world city;
- Establish and maintain the leading position in each service the company provides;
- Maintain the most admired, highest quality brand in real estate;
- Recruit, hire and retain the finest people in the company's industry;
- Foster and maintain a culture of integrity, excellence and continuous improvement; and



• Lead the industry in revenue and profit growth and retain the industry's highest operating margins.

CBRE has a strong competitive position and holds the number one market share position in the world. Annex figure 4 indicates CBRE's global brokerage market share (in \$ billions) in relation to its nearest competitors.



ANNEX FIGURE 4: CBRE GLOBAL BROKERAGE MARKET SHARE

CBRE's scale drives a number of competitive advantages in terms of value creation. Some of the competitive advantages include:

- Most in-depth market intelligence in each local market worldwide;
- Strategic consulting resources supporting the company's accounts with portfolio optimization, location analysis, headquarters solutions, etc;
- Ability to attract the industry's leading real estate professionals; and
- Ability to continually invest in research & development for state-of-the-art innovative technology tools, market research and training for the company's professionals.

SOURCE: "TOP 25 BROKERAGES" 2009 REPORT FROM NREI, APRIL 2009



#### Annex II: Digital Realty Trust, Inc. Company Overview [49]

Digital Realty Trust, Inc. (DRT) (NYSE: DLR) is a publicly traded company that owns, acquires, develops, redevelops and manages technology-related real estate for the purpose of providing data center solutions. The predecessor of DRT is a private equity fund, GI Partners, which was founded in 2001 and was renamed to DRT in 2004. DRT's data center products combine premises, infrastructure, and facilities management for companies seeking to expand their data center capacity or outsource existing data center operations.

DRT is headquartered in San Francisco and provides data center solutions for both American and international tenants across a wide variety of industries from information technology and internet enterprises, to manufacturing and financial services companies. In total DRT has built over 200 data centers worldwide.

DRT, as of January 25<sup>th</sup> 2010, owns a global portfolio of 84 data center properties located in North America and Europe. DRT's data centers contain applications and operations that are critical to the day-to-day operations of technology industry tenants and corporate enterprise tenants. Together these 84 properties add up to a total of approximately 14.9 million rentable square feet, including 1.9 million square feet of space held for redevelopment, which makes DRT the world's largest wholesale data center provider. DRT's portfolio of data centers is located in 27 markets worldwide, 20 markets throughout North America and 7 markets throughout Europe.

DRT's operations and acquisitions are focused on a limited number of markets where technology industry tenants and corporate data center users are concentrated. These markets include the Northern Virginia, Chicago, Dallas, Los Angeles, New York/New Jersey, Phoenix, San Francisco and Silicon Valley metropolitan areas in the U.S. and the London, Dublin, Paris, Amsterdam markets in Europe.

Annex figure 5 provides an overview of DRT's global presence in key data center markets.




### ANNEX FIGURE 5: DRT'S GLOBAL PRESENCE IN KEY DATA CENTER MARKETS

SOURCE: DRT'S INTERNAL COMPANY DOCUMENTS

DRT provides data center solutions to over 50 Fortune 500 companies which include leading technology-based, media, financial services and communications businesses. These customers require advanced data center facilities that incorporate sufficient power, cooling and security to support their mission critical applications. In 2008 DRT had approximately 350 tenants in their data centers and close to 900 leases in place. Some of DRT's major tenants include: Savvis Communications, Facebook, Inc., JPMorgan Chase & Co, AT&T, Equinix Operating Company, Inc., Qwest Communications International, Inc., Morgan Stanley, Yahoo! Inc., Microsoft Corporation and HSBC Bank PLC.

DRT's net income in 2008 was \$67.7 million, which was a 67% increase compared to the year 2007. The company also managed to raise \$813.5 million of new capital in the year 2008.



### Annex III: Core Competences as Source of Competitive Advantage

Reed and De Fillippi (1990) note that developing or improving the core competences of a firm can potentially lead to a competitive advantage. The rationale behind this is that companies more specialize in their core competences than the company's competition. The competitive advantage created by firms is often a consequence of utilizing the firm's distinctive competences.

The literature agrees on two important aspects of a competency: the source of competency is always internal to the firm and a competency is produced by the way a firm utilizes its internal skills and resources, relative to the competition (Reed and De Fillippi, 1990).

Hamel and Prahalad (1990) argue that in order to be able to effectively compete with rivals and outperform them, a firm will need to develop core competences and the firm's internal strategy should be in support of that goal.

Johnston, Wilkinson and Ritter (2002) define a core competence as: 'the ability of a firm to develop and manage relationships with key suppliers, partners, customers, competitors and other organizations and to deal effectively with the interactions among these relations'. The interaction between a network of relationships as described is shown in annex figure 6.







For example the firm's relationship with the customer can become a way of differentiation from competitors, which, according to Porter (1980, 1985) is one of the two ways to create a competitive advantage.

Awuah (2007) addresses the need for firms to figure out how they want to position themselves in the competitive environment, the desired future state. A firm needs to develop and maintain its competitive position in the long term to be able to outperform its competitors. In order to do that firms need to create something that is difficult for competitors to copy (a sustainable competitive advantage).

David (1999) adds to this by arguing that a sustainable competitive advantage does not generally come from doing the same things better, but comes from doing the critical things differently in ways that are hard to copy by competitors.



# Annex IV: Strategic Alliances as Source of Competitive Advantage

Johnson et al. (2008) state that in strategic management there are three main strategies developed by organizations in their growth process: internal development, mergers and acquisitions and strategic alliances. They also note that forming a strategic alliance has become an increasingly common organizational form in the pursuit of competitive advantage. O'Farrell and Wood (1997) define a strategic alliance as: 'an agreement between autonomous firms to collaborate in the future in pursuit of mutually beneficial goals'. In a strategic alliance two or more firms jointly serve the client, which is shown in annex figure 7.



ANNEX FIGURE 7: FIRM-CLIENT RELATIONS IN A STRATEGIC ALLIANCE (O'FARRELL AND WOOD, 1999)

Forming a strategic alliance is often triggered by increasing competition, technological change and a recognition that access to information is a strategic resource (Spekman and Celly, 1995).

O'Farrell and Wood (1999) indicate that a strategic alliance among firms may arise when there is a specific client demand or as a response to general market signals.

Strategic alliances provide means for companies to gain quick access to needed capabilities recognizing that no one firm alone can create all critical resources needed to prosper and grow (O'Farrell and Wood, 1999).



Strategic alliances often involve joint working between the partners on certain agreed activities and an arrangement to carry out specific complementary activities separately (O'Farrell and Wood, 1999).

Forming a strategic alliance belongs to one of a company's strategic options. It is therefore useful to analyze the possible benefits that can result from a formal strategic alliance. O'Farrell and Wood (1999) identify the following four possible benefits resulting from a formal strategic alliance:

- 1. To share the risks of an activity that is beyond the scope of a single organization;
- 2. To benefit from possible economies of scale in joint 'production';
- 3. To derive economies of scope by gaining access to complementary knowledge and expertise of partners in the value chain; and
- 4. To gain a first mover advantage in a market and thereby deter potential competition.

Supplementary to this Numfor et al. (2007) add a number of possible objectives for forming a strategic alliance. These include: gaining access to certain markets, reducing the risks generated by rapid environmental change, sharing complimentary skills, acquiring new knowledge or obtaining resources beyond those available to a single organization.

O'Farrell and Wood (1999) indicate that the success of a strategic alliance greatly depends on how well the strategic alliance performs relative to the expectations of the participating companies. In addition, they identify seven determinants of strategic alliance success:

- 1. The complementarity of skills between the companies, and with clients;
- The longevity of the strategic alliance, including any earlier proto-strategic alliance relations;
- 3. The existence of mutually beneficial goals;
- 4. The identification of general market opportunities rather than specific opportunities sought through ad hoc forms of collaboration;
- The emergence of new, more complex market needs for expertise beyond the scope of individual companies;
- 6. The relationship of strategic alliance work to other projects at the time, i.e. capacity and commitment constraints, which might vary cyclically; and
- 7. The type of market, the client relations required, and the nature of projects;



# Annex V: Competitive Strategy

Strategies are usually developed to solve organizational problems or to grasp new business opportunities in order to ensure a company's survival or growth ambition (Numfor and Ajang, 2007).

Johnson et al. (2008) define strategy as: 'the direction and scope of an organization over the long term, which achieves advantages in a changing environment through the configuration of resources and competencies with the aim of fulfilling stakeholders' expectations'.

As an alternative Numfor et al. (2007) define strategy as a means of locating a company within its environment. They argue a strategy should be used as a mediating force between the company (the internal context) and its environment (the external context).

In order to develop an effective competitive strategy it is important for a company to first analyze and understand its current situation. As a second step a company should think of its desired future state. Based on this analysis a company can then set out a strategic plan to reach the desired future state.

Porter (2002) specifically stresses the importance of having a competitive strategy in place for real estate services firms. He notes that real estate services firms in booming economic times can often rely on pure transaction management and getting deals done as a strategy, but that in difficult economic times an effective corporate strategy is an absolute necessity. Porter (2002) argues that real estate services firms need to make deliberate choices on how to compete in the future, which means they need to develop a clear understanding of the particular industry or segment they are in.



# Annex VI: Professional Services Firms

As the term indicates, one obvious defining characteristic of a PSF is that its output is a service, rather than a product, which is indicated by the 'S' in PSF (von Nordenflycht, 2007). The service provided by a PSF is also often 'intangible'. Lowendahl (2000) however makes one critical and legitimate remark to this by noting that the service often results in a tangible output transferring to the client (e.g. reports from consultants, contracts from lawyers etc). Lowendahl's remark is also applicable to CBRE, where real estate professionals, for example, provide their clients with a tangible market report, lease proposal or finalized lease agreement.

Apart from the above mentioned characteristics of a PSF, von Nordenflycht (2007) indicates that giving a single definition of a PSF can be a difficult task since it can have so many distinguishing characteristics. However, in an attempt to define a PSF, von Nordenflycht (2007) addresses four distinctive characteristics he believes are representative of a professional services firm in general: human capital intensity, capital non-intensity, knowledge intensity and customization. These four distinctive characteristics are briefly discussed to gain a better understanding of a PSF.

The first distinctive characteristic of a PSF is its 'human capital intensity' which refers to the degree of human capital needed for the 'production' of a firm (von Nordenflycht, 2007). Human capital relates to e.g. the employee's education, training, expertise, talent, creativity, social relationships, etc. When the human capital intensity in a PSF is high most of a firm's employees have high levels of human capital (von Nordenflycht, 2007). Maintaining high levels of human capital within a PSF can become a firm's competitive advantage.

As annex figures 8 and 9 illustrate, real estate services firms like CBRE (respectively referred to as 'Realtors' and 'Real Estate Brokerages') have on average a high level of human capital intensity. They are therefore categorized as 'Pure Human Capital Firms'.



ANNEX FIGURE 8: FIRST TYPOLOGY OF PROFESSIONAL SERVICES FIRMS (VON NORDENFLYCHT, 2007)<sup>4</sup>



ANNEX FIGURE 9: SECOND TYPOLOGY OF PROFESSIONAL SERVICES FIRMS (VON NORDENFLYCHT, 2007)



<sup>&</sup>lt;sup>4</sup> 'Ur-PSFs' are the oldest classic professions including: law, medicine, accounting and architecture (von Nordenflycht, 2007).

The second distinctive characteristic of a PSF is its 'capital non-intensity', which measures a firm's quantity of non-human capital, such as a firm's plant, property and equipment (von Nordenflycht, 2007). This 'capital non-intensity' often tends to be high in PSFs, which is also true for CBRE.

The third distinctive characteristic of a PSF is its 'knowledge intensity', which refers to the degree that the service production relies on a substantial, complex body of knowledge or expertise (Starbuck, 1992; Winch and Schneider, 1993). This is a very relevant characteristic to describe real estate services firms since their 'knowledge intensity' is high and often provides a source of competitive advantage.

The fourth and final distinctive characteristic of a PSF is the degree of 'customization', which refers to the production of a customized output (von Nordenflycht, 2007). This characteristic is also often seen in real estate services firms who traditionally tailor their expertise and services to a client's specific situation and requirements.

Lowendahl (2000) points out that customization to a client's specific situation can often require high-quality inputs from the clients themselves.

Real estate services firms need to acquire accurate information on the client's specific situation in order to be able to adequately provide their professional services. This creates the need for substantial client interaction during the process.

Von Nordenflycht (2007) indicates that PSFs can also be seen as 'expert advisory services' since they use their expert knowledge and experience to provide their clients with expert advice. This is stressed by the 'P' of 'Professional' referring to the earlier described knowledge intensity of PSFs (von Nordenflycht, 2007). Real estate services firms often have a high degree of knowledge intensity in relation to their clients, markets and transactions.



# Annex VII: Six Forces Analysis

# Threat of New Entrants

Based on the growth expectations of data center supply and demand in Northern Virginia one can argue that this data center market is a very attractive market for new entrants. However, the barriers to enter the data center market as a new startup data center provider are considered to be reasonably high. The main reason for this is the need to secure: adequate power, the technical know-how and skills, qualified and specialized personnel and adequate capital to build and maintain a working data center. In addition, a new entrant needs to have the financial capacity to expand in case power requirements go up and tenants want to expand their data center space.

The current economic environment limits the possibility to lend startup capital from banks, which makes it harder for new entrants to enter the data center market. After taking into account all aspects discussed, the threat of new entrants entering the Northern Virginia data center market is considered to be low.

# **Bargaining Power of Suppliers**

The bargaining power of suppliers on the Northern Virginia data center market is, because of limited availability of information on this subject, analyzed from DRT's perspective. DRT has global purchasing agreements with all their suppliers of data center materials, including the ones in Northern Virginia. When negotiating for global purchasing agreements, DRT is able to realize numerous quantity discounts, which indicates a low bargaining power of suppliers. However, there is one exception. DRT has no global or local purchasing agreement with the supplier of power in Northern Virginia. Power is an important requirement for operating data centers. In Northern Virginia, Dominion Virginia Power is the only power supplier. Being the sole supplier of power increases the bargaining power of this supplier and limits the bargaining power of DRT and other data center providers in Northern Virginia. However, in general, data center providers in Northern Virginia have a lot of bargaining power when it comes to buying supplies to build their data centers.

The reason for this is the large number of suppliers to choose from when they negotiate for global purchasing agreements. The bargaining power of suppliers is therefore limited.

In addition, DRT has global purchasing contracts with a minimum of two suppliers for all the data center materials they need. In this way DRT is never dependent on only one supplier, which further limits the bargaining power of those suppliers.

After taking into account all aspects discussed, the bargaining power of suppliers is considered to be low.

# **Bargaining Power of Buyers**

In order to analyze the bargaining power of buyers, a list of possible wholesale data center buyer groups is created. They include:

- Internet application providers (e.g. Google, Microsoft, eBay);
- Colocation data center providers (e.g. Equinix);
- Financial institutions including banks and insurance companies (e.g. HSBC, Morgan Stanley);
- Telecommunications carriers (e.g. AT&T, Verizon);
- Manufacturing and energy enterprises (e.g. BP, Toyota);
- > Technology enterprises (e.g. Capgemini, AMD); and
- Internet content, entertainment and social networking providers (e.g. Facebook, LinkedIn);

The bargaining power of these possible buyers is considered to be high since they can choose from a number of wholesale data center providers in Northern Virginia that offer data center space. The available data center providers in Northern Virginia are discussed as part of Porter's fifth force, the rivalry among existing competitors.

If a data center provider is not able to convince the buyer that they offer the best data center product for the best price, buyers will simply lease data center space from one of the other data center providers in Northern Virginia. And when buyers are looking for data center space they will play out the competition against each other in order to get the best deal.



At the same time the different wholesale data center providers will compete heavily with each other in order to secure a deal, which further illustrates the high bargaining power of buyers on the Northern Virginia data center market.

# Threat of Substitute Products or Services

Technological developments and new technological inventions can threaten the dynamics of data center operations in the future and can influence the Northern Virginia data center market. New technological inventions can for example lead to other ways of storing data, which could make data centers redundant. In addition, changes in industry practices, standards or in technology could reduce the demand for physical data center space. Some current substitute trends that can have a long term effect include: advancements in virtualization technology and advancements in more efficient computing and networking devices.

In terms of a direct threat of substitute products or services, wholesale data centers face the threat of colocation data center providers and managed services providers.

The services offered by these managed services providers include: firewall protection, security, storage and hosting. These services are not offered by wholesale data center providers and an increasing demand for these services can threaten the demand for wholesale data centers. In addition, the further adoption of remote access, wireless data and the increasing amount of home office workers will most likely further drive demand for these managed services.

Another direct substitute product that can threaten the demand for wholesale data centers in Northern Virginia is offered by a company named Dock IT [12]. Dock IT is a company based in Reston, Virginia that provides data center facilities for containers with a power capacity of 150 to 650 kilowatts per container. Dock IT currently has six data center containers (4,000 square feet of usable data center space per container) ready for use and has planned to build another twenty in 2010. Annex figure 10 provides an overview of the design of Dock IT's container data center.



# ANNEX FIGURE 10: DOCK IT'S CONTAINER DATA CENTER



SOURCE: DATA CENTER KNOWLEDGE

The container design typically houses two data centers. It is supported by office space, cooling systems and power systems including generators. One of the advantages of this new concept is its flexibility to move and ship the equipment to any location in the world. Another advantage is its efficient use of power on a per-kilowatt basis [13]. Because of the advantages, this new data center design can form a serious substitute threat to wholesale data centers in Northern Virginia.

Together with the other identified substitute products or services, the severity of this threat is considered to be high.

# **Rivalry Among Existing Competitors**

The five major wholesale data center providers in Northern Virginia are: DRT, DuPont Fabros Technology, Inc. (DFT), CoreSite, Power Loft and DBT Data. With regard to this threat DRT's four direct wholesale data center competitors in Northern Virginia are analyzed. Indirectly, DRT in Northern Virginia also competes with the following colocation providers and managed services providers: Equinix, Terremark, 365 Main, Rackspace, Savvis, Pryme Technologies, Net2EZ and Switch & Data<sup>5</sup>.

<sup>&</sup>lt;sup>5</sup> Due to the limited time available for this research the decision is made to analyze only DRT's four direct wholesale data center competitors (as indicated by DRT) and the rivalry among them. The indirect competition from colocation and managed services competitors is not taken into account as part of this research.



For DRT it is important to have a thorough understanding of their direct competition within the Northern Virginia data center market. Reason being, if competitors offer data center space to potential new tenants, who perceive their offer to be superior based on factors like available power, security, location, connectivity or rental rates that are below DRT's rental rates, the company may lose potential new tenants. That situation could harm DRT's operations and could incur substantial costs needed to either improve the company's data centers or reduce its rental rates. Therefore, the four direct wholesale data center competitors of DRT in Northern Virginia are discussed individually.

### **DUPONT FABROS TECHNOLOGY, INC.**



DuPont Fabros Technology

DuPont Fabros Technology, Inc. (DFT) is a Real Estate Investment Trust (REIT) specialized in owning, developing and managing technologically complex data center facilities [14]. The company operates out of Washington D.C. and offers a data center product, with which they have been able to secure both large national and international data center customers like Microsoft, Facebook and Yahoo. DFT has a number of strengths that give the company a competitive advantage. DFT's main strengths include [15]:

- Having the ability to provide data centers with flexible designs, high power capacity and long, useful lives;
- Having strategically located data centers with a focus on the major metropolitan areas;
- Having the ability to focus on both large capacity deals and on smaller deals. DFT is able to offer its customers dedicated capacity in increments as small as 2,500 square feet (500 kilowatts);
- Having a low upcoming lease turnover in the coming few years. DFT has very few leases expiring over the next few years. Ninety percent (90%) of their portfolio annualized rent is expiring before the end of 2014;
- Having high quality tenants with strong credit. Microsoft and Yahoo are DFT's two biggest tenants and cover over sixty percent (60%) of the company's annual income. These companies account for a high-credit customer base and a low risk of tenant bankruptcy; and



Having a strong local development pipeline and proven track record. DFT's existing data center supply on the Northern Virginia data center market comprises of six data centers (VA3, VA4, ACC2, ACC3, ACC4 and ACC5). DFT's development pipeline for the Northern Virginia data center market comprises of two data centers (ACC6 and ACC7). ACC6 is a data center that is planned to be built in Ashburn, Virginia on approximately thirty acres of land. t will be build in two phases and will total 300,000 gross square feet with an aggregated critical IT load of over thirty megawatts [16]. ACC7 is also planned to be built in Ashburn, Virginia on approximately the built in one phase and will total 100,000 gross square feet with an aggregated critical IT load of over thirty ten acres of land. It will be build in one phase and will total 100,000 gross square feet with an aggregated critical IT load of over ten megawatts [17].

Because of the identified strengths and substantial data center supply in Northern Virginia, DFT is considered to be a strong competitor and big contributor to the rivalry among existing competitors within this marketplace.

#### CORESITE



The second direct wholesale data center competitor on the Northern Virginia data center market is CoreSite. CoreSite is an American company based out of Denver, Colorado. CoreSite is a wholly owned operating partner of The Carlyle Group, a global private equity firm with \$84.5 billion of assets under management as of March 31, 2009 [18]. CoreSite provides reliable, private, secure and scalable data centers that improve business continuity and promote growth of company ICT infrastructures [19]. One of CoreSite's strengths is the company's ability to provide real-time data for its customers on data center temperature, humidity and power consumption. This is provided through the so-called MyCoreSite customer portal. In addition, CoreSite's data center offering is based on a fixed dollar per kilowatt pricing structure and usage-based power model [20]. With this model, customers only pay for the actual power they use. As an additional service, CoreSite provides estimates and detailed, transparent reconciliations concerning customer expenses [21]. The company tries to gain a competitive advantage in the market by the discussed additional service offering. The Carlyle Group's reach and financial strength also creates a competitive advantage. In addition, CoreSite considers its reliability, credibility, experience in the data center industry and its real estate business relationships to be the company's main strengths.

One identified disadvantage of CoreSite's offering is the fact that there is a reasonable amount of office space adjacent to their data centers in Northern Virginia (mixed-use), which for some potential tenants raises security concerns.

CoreSite's current data center supply in Northern Virginia comprises of two existing data centers, one in downtown Washington D.C. and one in Reston, Virginia. The data center facility in downtown Washington D.C. is a 20,000 square feet data center with a power density up to eight kilowatts per cabinet. The data center in Reston, Virginia is a 285,000 square-foot data center facility. It is designed to accommodate an aggregated twelve megawatts of critical IT load. At this point, CoreSite has no data centers in the development pipeline for the Northern Virginia data center market.

CoreSite's competitive strength on the Northern Virginia data center market is considered to be moderate. The company has a number of competitive strengths as described, but has a modest data center presence in Northern Virginia with no data centers in the local development pipeline, which makes CoreSite a moderate contributor to the rivalry among existing competitors.

# Power Loft



The third direct wholesale data center competitor is Power Loft. Power Loft is a privately held company headquartered in McLean, Virginia and specializes in the development and ownership of high density and high security data centers [22]. The company's main competitive advantage is its environmental friendly data center design, which uses thirty percent (30%) less power than traditional data centers. As a result, the company received the Northern Virginia Technology Council's Green Award in 2009. The award is designed to honor area technology companies, universities, and organizations for their work towards carbon footprint abatement, job creation in the region, energy efficiencies, and renewable power use [23].



Power Loft's existing data center supply on the Northern Virginia data center market comprises of one data center located in Manassas, Virginia.

This data center comprises of 225,000 gross square feet and has 100,000 square feet of usable data center space and a critical IT load of thirty megawatts. At this point, Power Loft has no data centers in the development pipeline for the Northern Virginia data center market.

Based on Power Loft's modest data center presence (with no data centers in the local development pipeline) and its limited number of competitive advantages, the overall competitive strength of this company on the Northern Virginia data center market is considered to be low. Power Loft, however, does have a potential sustainable competitive advantage with its environment friendly data center design, which in the future could lead to stronger competition and rivalry among existing competitors as this becomes more and more important for companies.

#### DBT DATA



The final direct wholesale data center competitor in Northern Virginia is DBT Data. DBT Data is a data center provider headquartered in Washington D.C. that acquires, develops, owns and operates data center facilities that are located in reliable, cost-effective and risk-averse geographical areas [24]. The company focuses on three types of data center tenants: federal, enterprise, and internet tenants. Additionally, the company targets high credit tenants with data center requirements greater than 5,000 square feet, who are preferably willing to sign long-term leases.

Besides offering wholesale data center space, DBT Data also provides colocation and managed services, something that most other wholesale data center providers do not offer. In addition, the company has a couple of other competitive advantages. The most important one being their 'green' data center design, which makes their data centers thirty to forty percent (30-40%) more power efficient than traditional data center facilities. Another competitive advantage is the company's team of engineers, architects and IT professionals who have over twenty five years of experience in designing, building, and managing mission critical facilities [25].



DBT Data's existing data center supply on the Northern Virginia data center market comprises of one data center located in Harrisonburg, Virginia.

This data center comprises of 100,000 square feet of rentable square feet and has twenty five megawatts of critical IT load. One particular competitive advantage of this data center is its location, which is well outside the fifty-mile nuclear risk zone that surrounds Washington D.C. [26]. This secure location contributes to the overall security of DBT Data's data center, which makes it more attractive for the U.S. federal government. At this point, DBT Data has no data centers in the development pipeline for the Northern Virginia data center market.

Taking into account all aspects described, DBT Data's competitive strength on the Northern Virginia data center market is considered to be moderate. The company has a competitive advantage due to its green data center design and the strategic location of its data center in Harrisonburg. The location increases the chance of attracting data center tenants who require heavy security, such as the U.S. federal government. At the same time the company has a very modest data center presence with only one operating data center and no data centers in the local development pipeline, which makes DBT Data a moderate contributor to the rivalry among existing competitors on the Northern Virginia data center market.

Based on the sub conclusions of the competitors' competitive strength and their individual contribution to the severity of rivalry among existing competitors on the Northern Virginia data center market, the following final conclusion can be drawn. The rivalry among existing competitors on the Northern Virginia data center market is of moderate strength. The severity of this rivalry, however, might increase when new data center providers attempt to enter this market, which is a feasible option looking at the expected growth in Northern Virginia data center demand.

# The Government as 'Mega-Force'

The sixth force, added to Porter's basic five forces framework by Austin (1990), deals with the influence of the government. For this research the influence of the U.S. government on the Northern Virginia data center market is analyzed.



Northern Virginia consists of three counties: Prince William County, Fairfax County and Loudoun County. These three counties have a direct influence on the Northern Virginia data center market by their individual policies, incentives, laws and regulations.

As an example, Prince William County provides substantial tax savings for investments in computer equipment. This tax incentive has a direct influence on the Northern Virginia data center market, since data centers use a substantial amount of computer equipment. Annex figure 11 provides a comparison of taxes that need to be paid for a one million dollar investment in computer equipment in the different counties in Northern Virginia. It shows that Prince William County is a lot more attractive in terms of tax incentives than the other two counties. In Prince William County the taxes that need to be paid on a one million dollar investment in computer equipment are more than three times as low as in Fairfax County and Loudoun County.



ANNEX FIGURE 11: COUNTY TAXES COMPARISON ON A \$1M INVESTMENT IN COMPUTER EQUIPMENT

SOURCE: PRINCE WILLIAM COUNTY DEPARTMENT OF ECONOMIC DEVELOPMENT

In addition, the U.S. federal government, which is located in Washington D.C., also has a direct influence on the Northern Virginia data center market.



The government for example demands that current and future data centers have to comply with the Title III of the Americans with Disabilities Act (ADA) of 1990 [27], which requires that people with a disability have access to all public areas within a data center.

Having to comply with this act may incur additional costs in building a data center. Data center providers also have to deal with laws and regulations relating to the protection of the environment. These laws deal for example with possible contamination issues. Any liabilities or compliance issues can cause serious financial consequences for data center providers. In addition, possible other changes in real estate, zoning and building laws or increases in real estate property tax could also affect the operations of data center providers [28]. A final example is the U.S. Senate who has passed the so-called Cap and Trade Bill. The legislation of this bill is intended to reduce U.S. industrial emissions of greenhouse gases by up to seventeen percent (17%) by 2020 to avoid further global warming [29].

U.S. companies, including data center providers, are allocated right-to-emit credits based on the greenhouse gas they currently emit. Companies that emit fewer greenhouse gases are allowed to sell their excess portions to companies that exceed their allowances [30]. This new bill has serious financial consequences for data center providers, since they generally emit a high amount of greenhouse gases and will likely have to buy additional right-to-emit credits. The Cap and Trade Bill is expected to be the first in a series of new, environmentallyconscious legislative acts by U.S. Congress in the coming years [31].

The described examples indicate that the influence of the counties of Northern Virginia and the U.S. federal government is substantial. The influence, however, is not all negative as illustrated by the tax incentives in Prince William County. The overall influence of the government as 'mega-force' therefore is considered to be of moderate strength.

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