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Business Model Adaptation in Emerging Markets

A case study at AkzoNobel

Master of Science Thesis
in the Management and Economics of Innovation Programme

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Abstract

The purpose of this thesis is to gain an understanding for how an established MNE assesses growth opportunities in new markets and the implications of entry to a new market on its business model. Emerging markets present significant growth potential but also the challenge of being structurally different from developed markets. This implies that the business models firms employ in developed markets to generate competitive advantage are often challenged by the environment present in emerging markets. A theoretical framework was developed based on a literature review providing a basis for a structured approach to analyze emerging market conditions and the business model compatibility of AkzoNobel. Building on this insight, a case study was conducted at AkzoNobel comprising of a market analysis and an evaluation of their internationalization efforts in emerging markets. The market analysis was conducted on the market for colloidal silica in the catalyst segment in Asia to identify growth opportunities for AkzoNobel. Subsequently, the internationalization efforts of AkzoNobel were investigated in emerging markets including its current business model for colloidal silica.

Based on the findings of this thesis, firms assess growth opportunities over time, making low commitments to the market initially to mitigate risk. By using local distributors, firms are able to gain insight of the market and customers within the region. This enables firms to confirm available revenue streams and appreciate the market size, to thereby increase their depth of involvement in the market given suitable potential. Firms enter emerging markets by extending their current business model designed for developed markets. Since firms enter new markets with a low depth of involvement, the value proposition and value capture mechanisms of a business model are the first components to be challenged by the new external environment. The core value proposition remains the same between markets – as the firm's value proposition is able to generate competitive advantage in developed markets, it is assumed by the firm that it is likely to succeed in emerging markets as well. However, the value capture and delivery components of the business model are not strictly compatible in the new context of emerging markets and may require adaptation.

Keywords: Market analysis, business model adaptation, emerging markets, internationalization, entry strategy

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1. Introduction

This chapter helps motivate why internationalization to emerging markets is of interest to MNEs and provides background on the MNE studied – AkzoNobel. The area of focus, its colloidal silica business, is expanded on and subsequently the purpose, research questions and scope of this thesis are provided.

1.1. Background

Multinational enterprises (MNEs) in mature industries are finding it increasingly difficult to generate revenue growth in their established markets. As a consequence, MNEs have pursued mergers and acquisitions, with varying degrees of success to strengthen their position in the market. This trend has been particularly characteristic of the chemical industry, where most recently Dow and Dupont agreed to a merger of equals (Bloomberg, 2015). Further, MNEs are looking to expand into new regional markets to offset the slow growth in established markets. Given the asset intensity of mature industries, MNEs are put in a position where they need to carefully prioritize their capital allocation to the highest growth opportunities. Emerging markets present significant growth potential but also the challenge of being structurally different from developed markets. This implies that the business models firms employ in developed markets to generate competitive advantage are often challenged by the environment present in emerging markets.

AkzoNobel is an MNE with a leading position in paints and coatings, and a major producer of specialty chemicals. Well established in the developed markets of Europe and North America, AkzoNobel is finding it increasingly difficult to maintain high revenue growth and is therefore in a position where growth opportunities need to be actively explored. In terms of revenues, the three branches of paints, coatings and specialty chemicals are similarly sized, totalling $16 billion in 2015. Headquartered in Amsterdam, the company is active in more than 80 countries and has 45,600 employees worldwide. Furthermore, it is the industry group leader in sustainability in the materials industry, featuring in the Dow Jones Sustainability Index. By the nature of their products, AkzoNobel is positioned upstream in the value chain and has customers in a broad range of industries. The largest end-users are within buildings, infrastructure and industrial segments. Part of Specialty Chemicals is the Pulp and Performance Chemicals business unit, with its head office located in Gothenburg, Sweden.

The business in focus for this case study is the colloidal silica business, part of Pulp and Performance Chemicals business unit with its head office located in Gothenburg, Sweden. Historically, colloidal silica was a niche product for AzkoNobel, catering only to the pulp and paper industry. Operations began in the 1980s in Scandinavia with the paper application. To support the investments made in production sites, sales to other applications were explored. Over time sales to these other applications surpassed sales to the pulp and paper industry, with sales to industrial applications generating the largest share of revenues. In 2012, the potential of colloidal silica was recognized by management, and was labeled as a growth business allowing the business to focus on innovation and reach new markets. In 2014, AkzoNobel divested its paper chemicals business choosing to further focus efforts on pulp bleaching, colloidal silica and expandable microspheres.

AkzoNobel has a market leading global position in colloidal silica with successful innovation capabilities and strong product differentiation. Key business segments today for colloidal silica are electronics, paper, foundry, coatings, construction and catalysts. While colloidal silica is very much a global business for AkzoNobel, the markets of Europe, Middle East, Africa (EMEA) and North America account for almost 70% of revenues. As an established player in these developed markets, AkzoNobel are looking at expansion opportunities in Asia to tap into the rapid development within the region to drive higher revenue growth in the coming years. Furthermore, AkzoNobel believe that to effectively meet their growth target, the company needs to realize the potential for their colloidal silica product range in the catalyst manufacturing industry, which today accounts for a smaller part of the

revenue of the colloidal silica business. In the catalyst application, colloidal silica can function as a binder, raw material or support for the active substance. The global industrial catalyst market was valued at $17.15 billion in 2014 and expected to grow at a compounded annual growth rate (CAGR) of 4,2% until 2020 (Research and Markets, 2016).

1.2. Purpose and Research Questions

The purpose of this thesis is to gain an understanding for how an established MNE assesses growth opportunities in new markets and the implications of entry to a new market on its business model. To accomplish this, in order of priority, a market analysis was conducted on the market for colloidal silica in catalyst segment in Asia including China, India and the ASEAN region (Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam) to identify growth opportunities for AkzoNobel. Subsequently, the internationalization efforts of AkzoNobel were investigated in emerging markets including its current business model for colloidal silica.
To shape and structure the research, the following questions were used as a framework.

- How can an established firm looking to enter new markets critically assess growth opportunities?
    - What is the rationale looking for new geographical markets?
    - What is the process for assessing new markets?
    - How are analytics leveraged for intelligence and insight?
    - How can a firm gain understanding of the customer and how they perceive the value of its current offerings?
- How, and to what extent, is an established firm's business model for developed markets compatible with entry to emerging markets?
    - What are the generally accepted approaches to market entry?
    - How is the value proposition revised when addressing customers in emerging markets compared to customers in mature markets?
    - How is information shared between regions within an organization to leverage its global presence?

The market analysis was centered around market research, comprising of technical analysis, demand analysis and supply analysis to then draw upon qualitative insights from meetings with regional sales personnel to understand future growth potential. Data was found from reports, forecasts, existing studies and a number of databases that AkzoNobel had access to. To assess the compatibility of the business model to emerging markets, qualitative insight was derived from interviews, which were held with employees at different levels of the organization, ranging from the sales team to senior management at AkzoNobel's pulp and performance chemicals business unit.

1.3. Scope

This thesis is delimited by customer segment and geographical scope, considering the markets for colloidal silica. Colloidal silica is a performance chemical and a very versatile molecule, which can react with a range of other materials. Its functions include binding, polishing, gelling, dispersing and color acceptance. It is currently used in more than 20 technical applications, a number that has been growing year by year. This study will only consider the catalyst application, which today accounts for a smaller part of the total revenue for colloidal silica (Fig. 1).

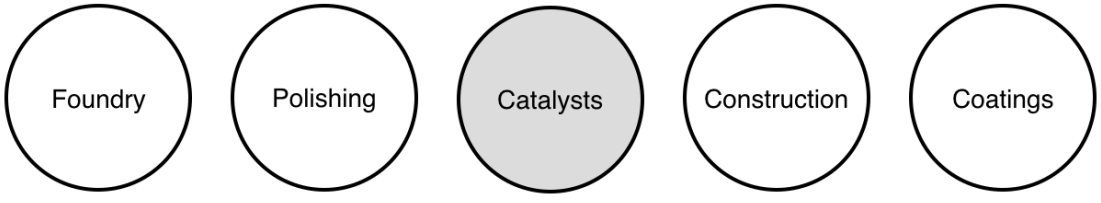

Figure 1: Illustration of colloidal silica product range delimitation

The second delimitation is the geographical scope. Regions considered in this study include China, India and the ASEAN region (Fig. 2). The ASEAN free trade area is a trade agreement between ten countries supporting local manufacturing in all ASEAN countries. The countries considered in the ASEAN region were Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam.

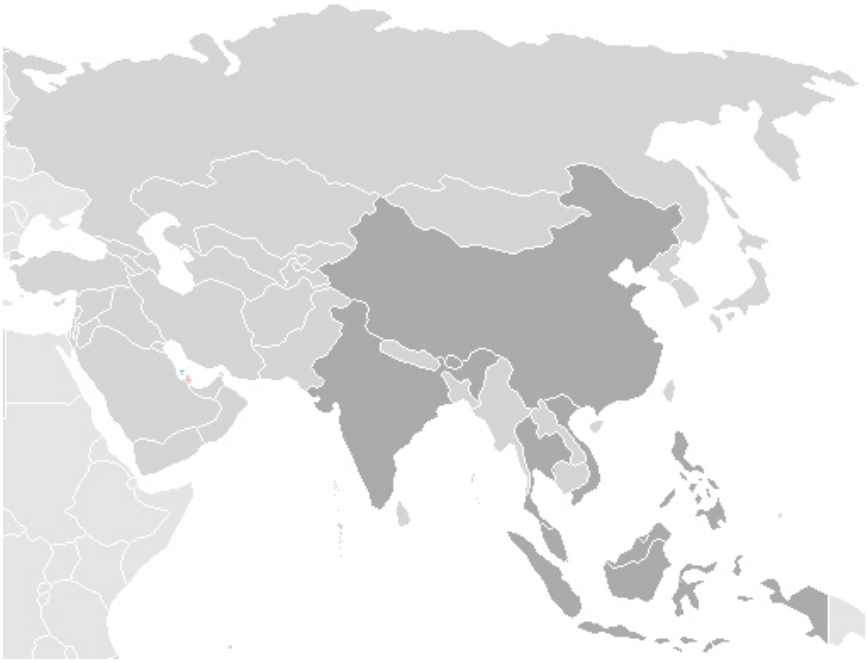

Figure 2: Geographical scope of study

1.4. Thesis Outline

Chapter 1 – Introduction: A background to AkzoNobel, the colloidal silica business and the purpose and scope of this thesis is given.

Chapter 2 – Theoretical Framework: Establishment of a working framework for this thesis through extensive review of literature.

Chapter 3 – Methodology: The research strategy and design is described together with the sampling. A presentation of how the data have been analyzed and a discussion on the validity of the research is included.

Chapter 4 – Findings: A presentation of findings from the case study's two components – the market analysis and the in-depth investigation of AkzoNobel.

Chapter 5 – Discussion: An analysis of the case study in relation to the theoretical framework is conducted. Two examples of business model innovation relevant to AkzoNobel are presented.

Chapter 6 – Conclusions: A summary of key learnings and contributions.

2. Theoretical Framework

This chapter will help establish context by providing the background and theory needed to address the research questions that this thesis seeks to answer. To do this effectively, a conceptual framework that maps the three different components for MNE international expansion has been developed (Fig. 3).

Figure 3: Overview of analytical framework

Market Analysis considers the first research question extensively, addressing how an established firm can critically assess growth opportunities in new markets. The intention of this component is to arrive at a target market. From here focus shifts to *Entry Strategy* – how does the firm enter the target market and with what depth of involvement? Central to this is compatibility of the current business model to that of the target market, the firm may find that there is a mismatch between their existing business model and one better suited to the target market. *Business Model Adaptation*, the final component of the framework, serves to use the assessment of strategic fit to identify potential for business model innovation to better serve the target market.

Broadly, internationalization theory seeks to explain the factors that influence a firm to expand internationally (Johanson & Valhne, 1977) and the process by which they increase involvement in international markets (Welch & Luostarinen, 1988). In the context of this thesis and the conceptual framework introduced above, the factors influencing the decision to pursue internationalization would feature prior to *Market Analysis*, establishing a basis for and motivating why the firm has chosen to explore new markets. This thesis does not strictly explore this, assuming that the studied firm's motivations for choosing to expand internationally are rational, focusing instead on the subsequent phases beginning with *Market Analysis*. The process by which the firm increases involvement in an international market is treated in *Entry Strategy*.

2.1. Market Analysis

2.1.1. Industry Specific Factors

Both general and context specific approaches to market analysis view the evaluation of international markets as a three stage process (Sakarya et al, 2007). Preliminary screening serves to identify potential markets as candidates for subsequent in-depth screening and identification – the second stage in the process. Screening criteria can include macroeconomic indicators as well as factors like market size, growth rate, fit between consumer preferences and the product and competitive rivalry. Identification may involve assessment of industry attractiveness and forecasts of costs and revenues associated upon potential entry to the given markets. The third and final stage of the process involves arriving at the selection of a target market; the market that best matches the firm's objectives and resources.

Knowing the total sales of a market is essential as the firm must be able to gain an understanding of how big of a market share it will be able to serve given its current capacity (Aaker, 2001). This estimate should be built by a bottom up approach, considering the subsegments of the market, as it gives a more dynamic picture of various market trends. Understanding the dynamics of the market is critical as the firm must identify which segments are growing and which are in decline, to formulate its strategy thereafter (Fig. 4). Useful sources can be government sources, trade associations and

import and export data. Further, the potential market should also be considered, as the usage and number of users of the product can change dramatically, thereby affecting the size of the market.

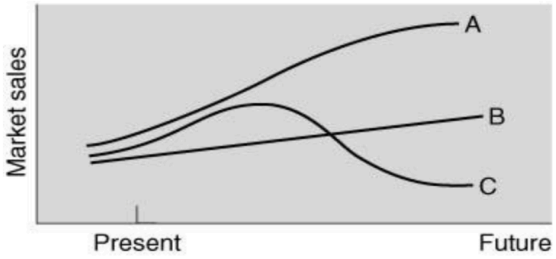

Figure 4: Evolving sales patterns (Aaker, 2001)

The importance of market potential must not be understated; as arguably the most important factor to *Market Analysis*, it is a primary driver of firm expansion to foreign markets (Yoshida, 1987). There is however a lack of consensus on what criteria to use in measuring market potential (Russow and Okoroafo, 1996). Commonly used indicators for market potential include market size, growth, competition and ease of access, predictions of demand and estimates of import demand (Sakarya et al, 2007). Indirect measures are also often used, employing approaches such as grouping where aggregate, general country indicators reflect market potential to a certain extent.

Customers plays a major part in understanding the industry environment (Grant, 2010). Analyzing customer preferences and needs is critical to identify opportunities and general sources of competitive advantage in an industry, as the firm has to create value for customers to generate profits. The price that customers are willing to pay for a product depends on a number of factors, which in turn affects market profitability. These factors relate to a large extent to competition, both from within and outside the industry and emerge from competitors, substitutes and the threat of new entrants. A saturated market is often represented by lack of product differentiation, overcapacity, lack of growth sources and buyer knowledge as the product matures (Aaker, 2001). Perfect competition within an industry entails absence of profit margins (Grant, 2010). A firm protects itself from competition by various barriers, which can include product differentiation, capital requirements, economies of scale, access to distribution channels and cost advantages. The cost structure of a firm plays a key role during times of economic turmoil. High fixed costs relative to variable costs can offer high operational leverage during an economic upswing but can prove disastrous for profitability when prices are pressured.

Emerging markets (EMs) introduce additional complexity and potential that must be captured by the market analysis (Sakarya et al, 2007). In order to do this, there is value in adding criteria such as future market potential of the EM, the competitive strength of the specific industry in the EM and even the cultural distance that separates the EM from the firm's country of origin. These criteria help account for some of the EM specific heterogeneity, rendering the analysis more meaningful.

Due to the cultural, but also geographical distance from EMs, many foreign firms lack the knowledge of designing efficient distribution channels for these markets (Ipsos Business Consulting, 2013). Access to an efficient distribution channel is often a key success factor, as it to a certain degree determines the commercial potential for a given product (Aaker, 2001). Alternative channels and trends should be considered. Analysis of trends in the use of alternative distribution channels is important as customer preferences can change, but also varies in different markets.

Furthermore, access to distribution channels can serve as a barrier to entry (Grant, 2010). When entering a new market, it is critical to create barriers as profits that are greater than of cost of capital will attract new entrants to seek participation in the given market. Barriers to entry mitigate the threat of new entrants from other industries and geographies. Other sources of barriers to entry include capital requirements, product differentiation and economies of scale. Substitutes to a product also

determine what customers are willing to pay for a given product, and thus affecting profit margins. The existence of close substitutes, giving the customers alternatives, depress prices and profits.

In summary Aaker's (2001) dimensions of market analysis capture the most relevant aspects to be considered to help gain an understanding of the markets studied to then be able to arrive at a target market for entry.

Customers	What is the average size of the customers? What are their needs? What are their R&D capabilities?
Size and Growth	What are the most important subsegments of the market? What are their size and growth characteristics? What are the drivers of demand?
Market Profitability	How intense is competition among existing firms? What are the bargaining powers of suppliers and customers? What substitutes are available in the market?
Cost Structure	What are the major cost and value added components of the products by competitors?
Distribution Channels	What different distribution channels are used and how are they changing?
Key Success Factors	What are the key resources and capabilities to compete successfully? How will these evolve? What strategies can help neutralize the resources and capabilities of competitors?

Table 1: Dimensions of a market analysis (Aaker, 2001)

2.1.2. Country Specific Factors

When analyzing country specific factors, it is necessary to restrict the analysis to trends and events that can pose significant impact to the strategy of the firm (Aaker, 2001). A PEST analysis examines the political, economic, social and technological factors that affect industries and firms. A PEST analysis attempts to identify the macro forces that explain the drivers of customer needs and why they occur, as it is recognized that the success and long term survival of a firm is dependent on the external environment in which the firm operates within (A Level of Achievement, 2004).

Political factors include environmental regulations, tax policies, competition regulations, contract enforcement law and political stability within a country (A Level of Achievement, 2004). Developments of regulatory constraints can pose opportunities or threats to a firm, and is therefore an important factor to analyze when considering long term investments in a country (Aaker, 2001).
Economic factors include economic growth, monetary policy, inflation rates and government spending (A Level of Achievement, 2004). The economic environment in a given country is likely to affect the performance of the firm. As an example, a low inflation economy may force firms to lower their profit margins as it may prove difficult to increase prices. For a firm in a capital intensive industry, it can be critical to make investments in a growing economy to avoid a damaging period of losses (Aaker, 2001).

Social factors include income distribution, demographics, education, social trends and living conditions (A Level of Achievement, 2004). Demographic trends can be a powerful driver of demand that is relatively predictable compared to other factors, which depend more on cultural trends in a country. Technological factors include R&D spending, innovation efforts, rate of technology transfer, speed of technological obsolescence and energy use and costs. In sum, it's important for firms to analyze and try to adapt to the political, economic, social and technological factors in a country. For large firms, a PEST analysis is often an ongoing process, where the information is given to

management who in turn can develop scenarios and possibilities for the firm. The output can then be used as input to strategy, product development, market planning and product portfolio management.

2.1.3. Framework for Analyzing Growth Opportunities

Combining industry and country specific factors, a complete picture of growth opportunities for a firm can be established (Fig. 5). The assessment of market profitability and the external environmental trends takes place in an iterative manner with the different aspects complementing one another. The firm takes advantage of opportunities in both the external environment and the market to create value for the customer and maximize profits.

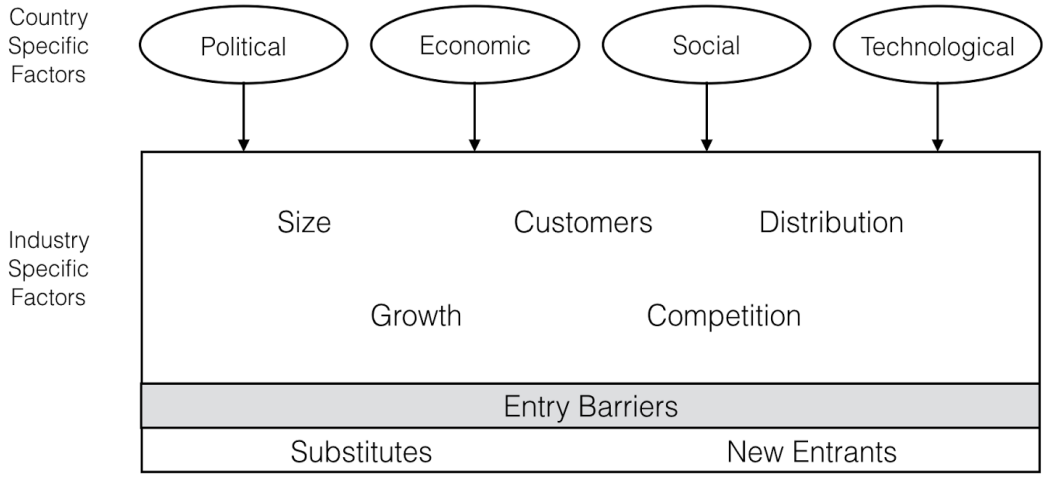

Figure 5: Framework for analyzing growth opportunities (A Level of Achievement, 2004; Aaker, 2001; Grant, 2010)

2.2. Entry Strategy

Having arrived at a framework for assessing growth opportunities, focus now shifts to *Entry Strategy*. As Dunning (1998) observes, it is assumed that the firm will make a rational entry decision shaped by the match between its objectives and cost of entry mode. The entry strategy articulates the planned method of delivering a product to a new market, and may not necessarily be a 1:1 replication of the firm's business model in its established markets – addressing this is the focus of our framework's final component, *Business Model Adaptation*.

Internationalization, the means by which a firm enters a foreign market, is characterised by risk (Rugman & Colinson, 2009). As a result, a firm's depth of involvement in a foreign market increases with time, as it acquires the capabilities and resources needed to mitigate the risks involved to an absorbable level (Fig. 6). The typical internationalization process therefore sees the firm choosing to initially pursue licensing, an entry mode with relatively low involvement and thereby risk in the foreign market, in exchange for fees or royalty. Subsequently as it gains more insight into the market it might see potential for increased sales through exporting, often via a local agent or distributor. Again this option does not entail significant long-term commitment to the foreign market, making it attractive from a risk perspective. The option offers limited upside however in terms of scalability and when exports gain more importance, the firm begins to increase its commitment to the market, by for instance setting up a local sales office. Only when thoroughly convinced of a foreign market's future potential will the firm set up a wholly owned subsidiary – foreign direct investment (FDI).

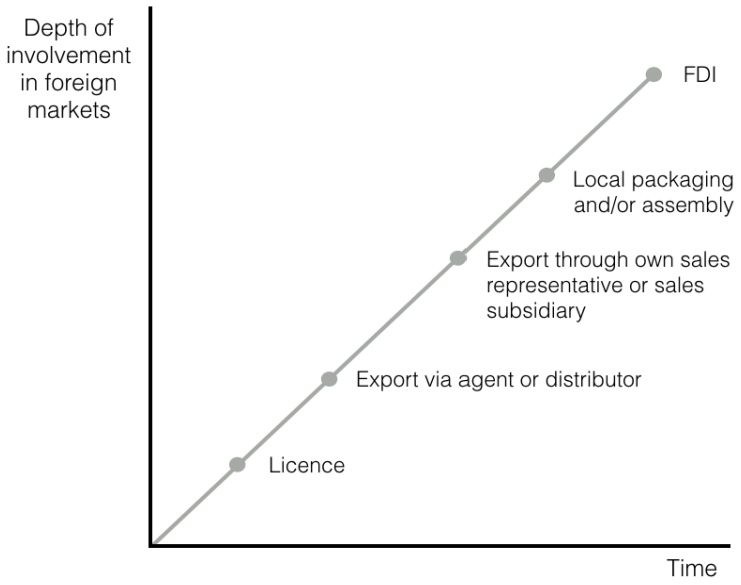

Figure 6: Depth of involvement in foreign markets (Rugman & Colinson, 2009)

Dunning's (2001) eclectic paradigm is a good example of this. The paradigm asserts that a combination of three driving forces explain the extent and pattern of a given firm's international production. The forces, also referred to as OLI-factors, relate to the advantages involved with ownership, location and internalization. Ownership advantages stem from a firm's privileged ownership of or access to income generating assets, relative to their competitors. Internalization advantages relate to the extent to which it is in the firm's interest to internalise the markets that generate and or use these assets, to add value. Location advantages explore the extent to which it is advantageous for the firm to locate value adding activities in foreign markets.

Through categorically assessing these advantages the eclectic paradigm proposes three general modes of market entry – licensing, export and foreign direct investment (FDI) – in a highly logical manner, each mode encompassing a greater degree of OLI-factor advantages.

OLI-Framework		Categories of advantages		
		Ownership	Location	Internalization
Form of market entry	Licensing	Yes	No	No
	Export	Yes	No	Yes
	FDI	Yes	Yes	Yes

Table 2: Eclectic paradigm (Dunning, 2001)

The eclectic paradigm does not distinguish between the market selection and choice of entry mode decision (Sakarya et al, 2007). An assessment structured in this manner offers advantages. It is in line with and supports Dunning's (1998) underlying assumption that firms make rational entry decisions shaped by the match between their objectives and cost of entry mode – it inherently considers strategic fit right from the onset while also favouring the traditional risk conscious internationalization process.

2.3. Business Models

The concepts of business models and strategy are often confused, as they at times are used interchangeably in business literature (Magretta, 2002). According to Teece (2009), strategy articulates how the firm deals with competition and how it can protect and widen its competitive advantage, while the business model is customer centric and articulates how value is created for the customer. Combining the two implies that the business model framework is applied to segment the market, creating a value proposition for each segment, setting up distribution channels to deliver that value and through strategy establishing barriers to prevent competitors to undermine the competition advantage of the firm. For long-term survival, it is essential that the business model adhere to the conditions that the strategy imposes, which otherwise deems the business model as unsustainable.

"The business model explains how the activities of the firm work together to execute its strategy, thus bridging strategy formulation and implementation." - Zott et al. (2011)

2.3.1. Value Creation and Value Capture

A business model fulfils multiple functions of a firm and can be seen as a sequence of activities (Teece, 2009). This sequence of activities can be described as a variation of the generic value chain that is representative of all businesses (Magretta, 2002). The sequence of activities can be divided into two parts (Fig. 7). The first one includes the activities that involves making the product or service, while the second includes activities that involves selling the product or service. The two parts of a business model can also be seen as functions of value creation and value capture, as described by Chesbrough (2003). It is necessary that the firm is aligned, meaning that the inherent logic of the business model is consistent with the activities that are involved in value creation and capture (Giesen et al., 2010). The objective of the second part of the business model, which is the focus of this thesis, is to enable the firm to sustain and grow its position within the value chain of the industry over time. The firm must be able to capture a piece of the value it has created in order to reinvest and return profits to its owners. According to Chesbrough (2003), it is appropriability that determine the ability of a firm to capture value of the value it creates. In some industries, intellectual property (IP) plays a large part in providing appropriability. More generally, it is the ability of the firm to protect its knowledge and innovation from imitators to sustain its profit margins.

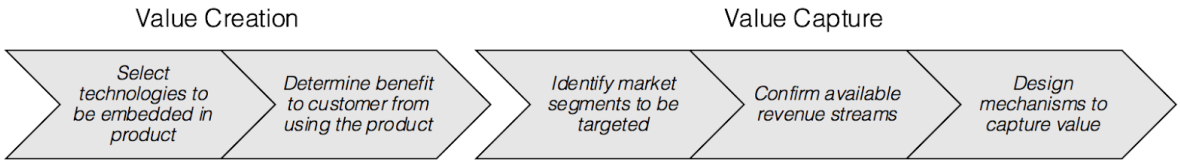

Figure 7: Value creation and value capture functions of a business model (Teece, 2009)

The business model pinpoints the value proposition offered via a product, service or bundle by the firm (Teece, 2009). It identifies the customer segments to whom the offering is useful to and what purpose it serves to the different customer segments. The value chain and what position the firm occupies within it is analyzed. Further, the complementary assets and distribution channels that are needed to support its position are identified. This stage is used as a design of the firm's value capture mechanisms, which are the ways in which the firm will secure revenues from their offering. Given the firm's position in the value chain and its value proposition, the cost structure of the business can be estimated, and thus also its profit potential. In sum, the business model describes the logic of how the firm creates and delivers value to customers.

The central premise of the business model framework is that the value of a product, service or bundle is determined by the business model it is commercialized through (Chesbrough, 2010). In other words, a product will generate very different results in terms of revenue and profit depending on the business model used to create and capture value. This implies that a technological innovation by itself does not

generate commercial success (Teece, 2009). Without a commercial strategy, the introduction of a technological innovation is unlikely to generate any profits for the firm. Thus, the business model that supports the technological innovation with a 'go to market' strategy and value capture mechanisms is vital to realize return on innovation investments.

2.3.2. Business Model Innovation and Adaptation

Business models are dynamic. Currently established and well performing business models cannot be seen as permanently given (Chesbrough, 2007, 2010). Doing so would fail to factor in the uncertainty of the constantly changing external environment, resulting in a mismatch between the new context and the existing business model, thereby weakening the firm and increasing the risk of failure (Landau et al., 2016; Doz and Kosonen, 2010). There is a need to maintain dynamism, constantly developing the business model to mitigate this risk of failure.

Business model innovation can be described as "the search for new business logics of the firm and new ways to create and capture value for its stakeholder" (Casadesus-Masanell and Zhu, 2013). There is an ongoing debate of how big of a change to the current business model is to be regarded as a business model innovation (Landau et al., 2016). Amit and Zott (2012) argue that modifications as well as extensions to the current business model of a firm also can be considered as business model innovations. The main motivation of business model adaptation is to "attain alignment with the environment" (Foss & Saebi, 2015). The differences between business model innovation and business model adaptation are highlighted below (Table 3).

	Business Model Innovation	**Business Model Adaptation**
Planned outcome	Disrupt market conditions	Align with the environment
Scope of change (areas affected)	Wise	Narrow-wide
Degree of radicalness	Radical	Incremental-radical
Frequency of change	Infrequently	Periodically
Degree of novelty	Must be novel to the industry	Novelty is not a requirement

Table 3: Business model innovation and adaptation (Foss & Saebi, 2015)

Teece (2009) argues that the traditional balance between supplier and customer has shifted due to developments in the global economy. The set of choices has widened for customers with the emergence of communication technology and open trading regimes. To remain competitive, firms need to be more customer focused and re-evaluate their value propositions to suit various customer segments. At the same time, firms must remain flexible and adapt their business models over time as markets, technology and legal structures change.

Although the customer is central to the business model framework, the business model also depends on suppliers, competitors and complementors in the regions in which the firm conducts business in (Chesbrough, 2003). It is the negotiating power relative to that of the suppliers and customers that determines the firm's ability to control the price level of a product (Michael Porter, 1980), and thus capture value. Firms do not operate in a competitive vacuum. Therefore, the firm needs to take the external environment into account to successfully innovate their business model (Zott & Amit, 2010). This requires that the functions of business model is integrated with the environment that the firm operates within as well as its customers and partners.

Giesen et al. (2010) state that it is critical to select an adequate business model that address emerging market opportunities and suits the economic environment. When pursuing new opportunities, the firm has to carefully review their current business model to determine how it can be improved to address new challenges. Business model replication refers to when a firm introduces a formally effective business model to a new context (Landau et al., 2016). As the new context may differ significantly challenges may arise, resulting in a need to adjust the business model to the new, different environment. Adaptation, a form of business model innovation, addresses this process of tailoring the business model to the new context. As an example, in times of economic turmoil or high uncertainty, firms strive to lower their cost structure and achieve higher flexibility by adopting partnering models or outsource parts of their operations (Giesen et al,. 2010). This enables the firm to scale up as new opportunities arise, but also scale down in times of decreasing demand.

By having a clear cut strategy for specific markets, firms can take advantage of its foresight to make global acquisitions at favorable prices and establish partnerships in uncertain economic conditions (Giesen et al., 2010). It has been shown that firms which enter an economic downturn with large financial means are better able to lever their resources to drive business model innovation and realize stronger margin performance relative to its peers (IBM Corporation, 2008). This is done by developing new value propositions and pricing models to fit evolving customer preferences (Giesen et al., 2010).

Landau et al., (2016) state that firms entering new markets extend their business model designed for developed markets, to then adapt it stepwise, consistent with their depth of involvement in those markets where changes in the business model counteract the challenges of emerging markets. These challenges may require firms to make changes to their value proposition, delivery and value capture mechanisms to better serve the customer needs. As a firm enters a new market stepwise, the value proposition and value capture mechanisms of a business model are the first components of its business model to be challenged by the new environment. Landau et al., (2016) state that the value creation component is in need of stronger adjustments compared to the value proposition and the value capture components. This is due to the fact that the value proposition is assumed to generate the same competitive advantage in the new context. When adjusting to emerging markets, firms maintain the fundamental design structure of their existing business model and do not innovate a completely new business model.

Giesen et al. (2007) state that for established businesses, business model innovation that focuses on partnerships and external collaboration is especially effective. Business models focused on network plays enable firms to be more flexible, as they are able to scale their operations more efficiently by new acquisitions and partnerships. Established firm are thus able to lever its brand, scale, channels or other core resources through external collaborations. In such a way, the business model becomes a competitive advantage that is separated from the company's position in the product market.

2.3.3. Adapting to Emerging Markets

In addition to the industry and country specific factors, emerging markets pose certain additional challenges to Western firms seeking to operate there. Landau et al. (2016) propose that the three greatest concerns are (1) the different institutional environments, (2) the lack in number and quality of external value creation partners and (3) the different customer segment compositions.

The challenges with institutional environments in emerging markets stem from institutional voids (Khanna et al., 2005). These voids are a result from the institutional environments being of lower quality than those present in developed markets, and in certain cases from them not being present at all. Institutional voids therefore hinder or increase the cost of transactions in the emerging market hurting the prospects for successful internationalization to these markets (Khanna and Palepu, 1997, 2010). This is of particular importance to firms who have established a working business model in developed markets that have efficient institutional environments in place, and then attempt to replicate

this to emerging markets. Adapting to the local institutional environment of the emerging market to overcome the institutional voids is necessary to achieve competitive advantage (Landau et al., 2016).

Firms in developed markets often rely on a number of highly integrated external partners, such as local suppliers and distributors, to create and deliver value to customers (Landau et al., 2016). The external partners are generally held to high quality standards and are expected to operate with professionalism. Emerging markets can pose a significant challenge in this regard as there is often a lack of external partners to engage with in transactions that meet the required expectations (Khanna and Palepu, 1997, 2010). The business model needs to be adapted to the state of external partners present in the market, suggesting a greater degree of involvement and development of these external partners than in developed markets.

Customer segment compositions in emerging markets often differ from those in developed markets. Khanna and Palepu (2010) generalize this to five prevalent segments: global, upper middle, lower middle, local and the bottom of the pyramid. Generally Western firms seeking to enter an emerging market target the global segment, leveraging quality, their brand and the paying ability of customers in that segment (Landau et al., 2016). Local firms maintain an advantage in the local and bottom of the pyramid segments by virtue of their locally produced products and lower price points. The upper middle and lower middle segments can be considered to be within reach of both the local firms and the new international entrant. Adapting a business model designed for market segments in developed markets to those present in the emerging market, by factoring in the different size, purchasing power and consumption behavior amongst the segments may be necessary to better penetrate the market.

3. Methodology

In this chapter, the methodology of the study is described, including research strategy, design and methods. Reflections over validity, reliability and generalizability of the research are also addressed.

3.1. Research Strategy

The research conducted in connection to this thesis was qualitative in nature. Qualitative research is commonly associated with inductive research methods, whereas deductive research methods are more commonly used in quantitative research (Bryman & Bell, 2011). Inductive research is often referred to as a "bottom-up" approach, where observations are made in order to identify patterns and thereby be able to generate generalizations and new theories. In contrast, the approach to deductive research is to test theories against a stated hypothesis, and thereby be able to either accept or refute the stated hypothesis.

The main objectives of this research are to investigate how an established firm identifies growth opportunities in new markets and how it adapts its current business model to act upon these. An inductive approach was chosen as the purpose of this thesis is explorative in nature. It was deemed suitable as it was required by the researchers to map out the values for the organization and the various functions of its business model. Although the sample size of the interviews in the case study is relatively small, coding was used to increase the quality of the research.

3.2. Research Design

Yin (2002) suggests that case studies should have a clear design formulated before any data is collected, which was the intent of the researchers when performing this thesis. It is important that the research design takes into account the epistemology so as to frame a design that is well suited to the nature of the study (Easterby-Smith et al., 2012). The constructionist epistemology was deemed most appropriate for this study.

This thesis was conducted as a case study, which is a form of qualitative descriptive research where the researchers look in depth at a single organization – in this case AkzoNobel (Easterby-Smith et al., 2012). Case studies are based on direct observation and accounts from personal contacts within the organization, which are generally gathered through interviews. The unit of analysis in this thesis is the individuals of the organization.

As the scope given by AkzoNobel was initially wide, it was necessary to understand the values and objectives of AkzoNobel. The market analysis conducted for AkzoNobel was seen as a means to do this. The researchers were able to gain a firm understanding for AkzoNobel's product offering, the scope for internationalization, region specific insight and also establish contact with relevant personnel. Simultaneously, a literature review was conducted to grasp the concepts surrounding the field. This resulted in a narrowed scope and an identification of key variables for analysis. The subsequent data collection process was qualitative in nature and involved meetings with key personnel at the company.

When analyzing the data collected from the interviews, a mixed methods approach was used, applying both qualitative and quantitative methods to increase the validity of the result. The interviews were transcribed and coded to increase the credibility of the interpretation of the data. Further, a mixed methods approach enabled the researchers to gain a better understanding of the research problem and a more rigorous structure of the research design, compared to that of using any single method (Easterby-Smith et al., 2012). However, it should be stated that the thesis was produced dominantly by qualitative methods.

It should further be noted that the findings of this thesis, particularly those pertaining to the organization itself, are based to a significant extent on input from AkzoNobel. Potential bias is therefore acknowledged though the researchers have attempted to best negate this.

3.3. Data Collection Methods

In line with the established research design, data collected for this study consisted initially of secondary data to support the literature review and market analysis, after which focus shifted to primary data to support the case study. It was deemed suitable to conduct a literature review to attain insight related to the research. The multiple sources of data, offering different perspectives on the questions, provided the researchers with a basis to structure the problem and analyze it systematically. Building on this insight, it was suitable to subsequently adopt a more focused qualitative understanding of the problem specific to AkzoNobel, through interviewing personnel from various functions of the organization. The case of AkzoNobel was analyzed according to the theoretical framework developed by the use of secondary sources. With the input from the primary data, the assessment of growth opportunities and business model compatibility were analyzed in an empirical context.

3.3.1. Secondary Data

To gain an understanding for existing research on how firms assess growth opportunities in new markets and the compatibility of their business models to these markets a comprehensive literature review was conducted. To do this in a structured manner a conceptual framework consisting of three major components – *Market Analysis*, *Entry Strategy* and *Business Model Adaptation* – was developed. The first component, *Market Analysis*, extensively considered the first research question, addressing how growth opportunities in new markets are analyzed and the challenges with doing so. By reviewing literature relevant to this component a lens of theory was established, also serving as a suitable platform for the subsequent market research and analysis to be conducted.

Reviewing literature relevant to the *Entry Strategy* component established insight on how firms typically act on an identified target market for entry. *Business Model Adaptation* extensively considered literature on the long term sustainability of business models and the importance of adapting value capture mechanisms to changes in the external environment. The components thereby considered the second research question, addressing the compatibility of a firm's business model as it enters a new market, with a lens of relevant theory for analysis and discussion.

Literature reviewed consisted primarily of scientific papers, articles in journals and books relevant to the components. The conceptual framework developed ensured that the secondary data reviewed was strictly relevant to the study and maintained clear focus.

The market analysis conducted for AkzoNobel involved rigorous secondary data collection from numerous sources. Firstly, it was important to gain an understanding of the product – Colloidal Silica. To learn about its technical properties, nature and role in the catalyst application, material including handbooks and presentations from AkzoNobel were studied.

The subsequent market research involved a multifaceted approach. For each geographical market studied macroeconomic trends were identified with data and insight from sources such as the International Monetary Fund. Market information for each of the relevant industry segments was drawn from various consultant reports and chemical industry journals, and complemented by trade statistics and news articles. Relevant regulatory frameworks were identified from governmental sources. Additionally, a top-down approach was also adopted where key international catalyst players were mapped to identify their application areas, geographical regions of interest and future expansion plans, by looking into their annual reports and press releases.

3.3.2. Primary Data

To address the research questions and build on the insight gained from the literature review and market analysis, the internationalization efforts at AkzoNobel were investigated. The data collected was qualitative, through a series of interviews at the Pulp and Performance Chemicals business unit. The interviewees were from different functions in the organization and spread geographically across the regions of interest. This enabled both a holistic understanding of how AkzoNobel's Colloidal Silica business was developing and for the interviewees to freely discuss challenges specific to their role.

The interviews were semi-structured and adapted to the role of the interviewee. A discussion guide, briefly outlining the topics of interest, was sent to each interviewee prior to the interview. These topics of interest formed the red-thread of each interview but deviations based on what the interviewee was keen on emphasizing were encouraged. The majority of the interviews were conducted over online calls but those present at AkzoNobel in Gothenburg were interviewed in person. In total 10 interviews were conducted, each lasting approximately 45 minutes.

3.3.3. Sampling

The interviewees served across different functions of the business unit and were spread across the geographies of interest. Functions included sales, business intelligence, marketing and management. Geographically, the interviewees worked in both developed and emerging markets, enabling the study to contrast differences between the regions. The interviewees were deemed suitable for the study by the researchers' supervisor at AkzoNobel. Below (Table 4) the interviewees and interview type are presented.

Interviewee	**Interview type**
Sales Manager China	Online meeting
Sales Manager Japan	Online meeting
Sales Manager Korea	Online meeting
Business Champion of Catalyst Application	Online meeting
Business Intelligence Manager	Face to face
Business Intelligence Analyst	Face to face
Regional Sales Manager ASEAN/JP/KR	Online meeting
Regional Sales Manager of EMEIA/ANZ, Business Champion of Coatings Application	Online meeting
Director Sales and Marketing	Face to face
Marketing and Product Manager	Face to face
Sales Manager India	Online meeting

Table 4: Interviewees and interview type

3.3.4. Validity, Reliability and Generalizability

As this research pertains to the constructionist epistemology the associated validity, reliability and generalizability risks have all been adequately addressed (Easterby-Smith et al., 2012). To ensure validity a sufficient number of perspectives must be included in the study. This was addressed by including interviewees from both a broad range of functions and geographies within the business unit.

Reliability of the study relates to if similar observations would be arrived at by other observers. To ensure reliability, the study maintained a focused research aim and adapted the interviews to treat focal issues of relevance relevant to the role of the interviewee. The subsequent analysis of data collected was conducted in a systematic manner, following accepted coding and interpretation practices. With regards to generalizability, the nature of the research questions relates broadly to how growth opportunities in new markets are analyzed and the potential business model adaptations that must take place to succeed in a given new market. It is fair to assume that the findings from this study are generalizable to not only actors within the chemical industry, but also actor in other areas who are actively exploring and acting on opportunities in new markets.

3.4. Data Analysis

Analysis of market data collected took place in a structured manner. Each geographical region was analyzed separately, consolidating macroeconomic trends and industry specific findings to arrive at indicative forecasts for future catalyst demand across the different segments. For each geographical region a report and presentation was produced, summarizing the findings and analysis. The material was presented to each regional sales team to discuss the findings and initiate a feedback loop. This enabled further input to the analysis before finalizing the material delivered to AkzoNobel.

The primary data collected from the interviews was analyzed systematically. First, the interviews were transcribed. Key topics of interest for each research question were then identified and all the transcripts were scanned to assign relevant pieces of information to each topic – coding. Subsequently, each topic was then again scanned to draw generalizable conclusions. From these conclusions a final topic-by-topic SWOT-analysis was conducted to parse the information into a consolidated format that could be easily analyzed through the lens of theory in the discussion.

4. Findings

This chapter presents the findings of this case study from its two components – the market analysis and the in-depth investigation of AkzoNobel. The market analysis provides initially technical context to help establish an understanding for catalysts, colloidal silica and their application areas, to then present country and industry specific findings. Subsequently the findings from the investigation of AkzoNobel's internationalization efforts in emerging markets is presented – comprising of how growth opportunities are assessed, entry strategy and business model compatibility.

4.1. Market Analysis

4.1.1. Technical Context

Catalysts are of central importance to several industries, as they are used to facilitate reactions in the production process of a wide range of compounds. A catalyst accelerates a chemical reaction without itself being consumed and may also have the ability to change the reaction path. Typically, only small amounts are required as catalysts are not consumed in the process. Thus, they can be continued to be used for processing of additional quantities of the reactant. Theoretically, this suggests that a catalyst can be used forever. However, this is not the case as the activity of a catalyst decreases due to material handling and exposure to various contaminants during its lifetime, which affects its usability. Therefore, there is a need for periodically replacing the catalyst in any catalytic process. Further, there is a drive to find more efficient and more long lived catalysts. These factors, along with discoveries of new uses for catalysts and economic growth contribute to continued growth of the catalyst industry (Yoneyama et al., 2013). On a large scale, catalysts help industries to lower their energy consumption and thus makes production processes more environmentally friendly (Fig. 8).

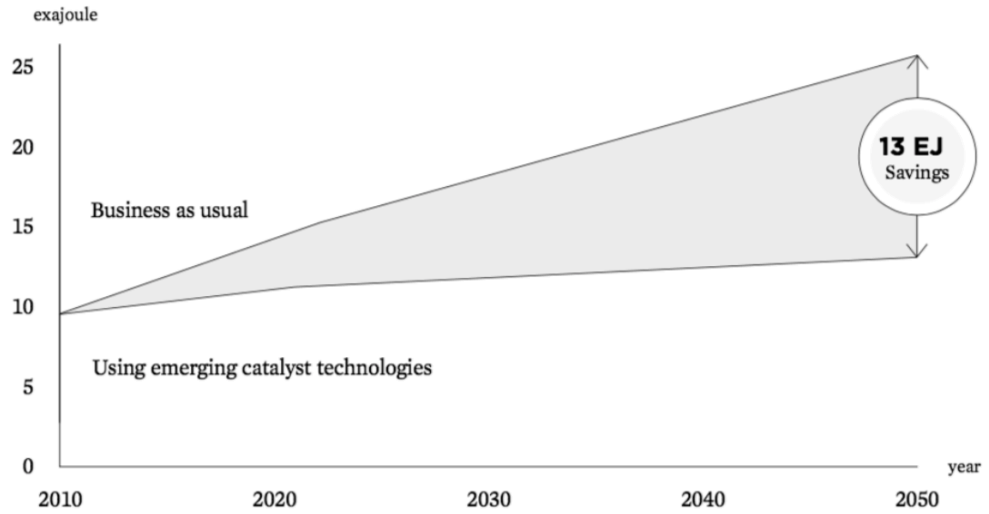

Figure 8: Projected energy savings from using emerging catalyst technologies (Clariant, 2016)

Catalysts can be categorized into two broad categories; homogenous and heterogeneous, where the difference between the two is determined by the physical states of the catalyst and its reactant (Subramaniam, 2015). Homogeneous catalysts are in the same physical state as its reactants. When added together, the two becomes a homogenous mixture. In contrast, heterogeneous catalysts are in a different physical state to its reactants. A common disposition is where the catalyst in a solid state catalyze a reaction in a gaseous medium. For such a reaction, the surface area of the catalyst is important as it determines the efficiency of the catalyst. Therefore, a porous structure is preferred.

Colloidal silica is mainly used in heterogeneous catalysts, and can function as a binder, raw material or support for the active substance. Hence, this thesis will focus primarily on the market for heterogeneous catalysts. The four industries of focus – oil refining, production of petrochemicals,

production of sulfuric acid and emissions control – and their potential end products or applications are presented below (Table 5), serving as a basis for the market analysis.

Industries	Application	Intermediaries / Product(s)
Oil refining	Fluid Catalytic Cracking	Fuel Oil
	Hydrocracking	Diesel
	Isomerization	Gasoline
Production of petrochemicals	Acrylonitrile and acrylic acid catalysts	Acrylic fiber, acrylic acid, plastic (ABS, SAN), NBR (synthetic rubber)
	Selective oxidation	-
Production of sulfuric acid	Production of sulfuric acid	Fertilizers, industrial raw material
Emission control catalysts	Selective Catalytic Reduction (SCR)	Diesel exhausts, industrial boilers
	Oxidation catalysts	Diesel exhausts

Table 5: Applications of heterogeneous catalysts in different customer segments

4.1.2. Country Specific Factors

4.1.2.1. China

China has transformed itself from a minor economy with little foreign trade to the world's largest exporter and the second largest oil consumer. Exports are dominated by manufactured goods such as ICT equipment, industrial machinery and textiles. The country recently became the world's largest economy measured in GDP on purchasing power parity (PPP) basis amounting to 19,400 billion international dollars. In 2015, the economy grew at a rate of 6.9%. Looking forward, GDP growth is expected to decrease to around 6.3% in 2016 and 6% in 2017. The government's economic policy is defined by five year economic plans. The current plan, which is the 12th, runs from 2012 to 2017, where focus is directed towards rising inequality, wealth distribution, increased domestic consumption and improved social infrastructure.

Due to environmental concerns and heavy pollution within the large cities, the government has increased its measures to fight pollution. Regulations of emissions from mobile sources are set centrally by the national government, each province and some cities. The current national standard is called China IV, which was implemented in 1 July 2013 for diesel engines. The Chinese emission standards are to a large extent based on the European standards, but tend to be implemented at a later stage. The new standards, referred to as China 5, will take effect 1 January 2018 for light duty diesel fueled vehicles. For heavy duty vehicles, the implementation of China 5 has been delayed until further notice. Similar to mobile sources, the Chinese government has set a standard that limits the amount of air pollutants from power plants in China.

Estimates of China's population in 2015 amounted to 1.4 billion, which is the world's largest. A one child policy was introduced between 1978 and 1980, which has led to a small youth population

compared to other age groups. The one child policy was abandoned in 2016, followed by a two child policy, which is now in effect and is expected to boost population growth. The country is still relatively poor with a GDP per capita on a PPP basis of 14,107 in 2015, which is lower than for example Thailand. Thus, there is high potential to develop domestic consumption, which has been realized by both the government and investors. However, differences in household income is still large, and has grown with the urbanization trend of the country, where approximately 53% of the total population now lives in urban areas. The average salaries of Shanghai and Beijing are still considerably below rates in South Korea and Hong Kong.

The rapid industrialization of the economy is reflected by the high investment rate, which accounts for around 46% of nominal GDP. A third of the investments have been undertaken by state-owned enterprises (SOEs). Alongside large investments, the government has been rolling out favorable innovation policies with the aim of outgrowing their image of being the factory of the world (Somaren et al., 2013). Chinese firms have in the past depended on imitation of developed markets and still are to some extent, but are moving more and more towards strategic innovations. However, the current business models of many Chinese firms characterized by economies of scale and thin margins are being challenged by the adjustment to more innovation intensive business models.

4.1.2.2. India

The Indian economy has ushered a new period of growth. In 2015, the economy grew at 7.5% despite other emerging markets facing a slowdown. Future prospects are positive. Forecasts suggest continued GDP growth in the order of 7.5% for 2016 and 2017, surpassing that of China's to become the world's fastest growing economy. In terms of purchasing power parity, with an estimated 8,000 billion dollars, India ranks third behind China and the US. The government is pushing strongly for modernization in industry and infrastructure, opening up to and facilitating increased FDI and attempting to stimulate innovation and skill development.

Pollution remains a major concern in India, particularly in larger cities such as New Delhi where air quality has been consistently deteriorating. Regulations on emission control – the Bharat standards – are set by the national government and implemented by the Central Pollution Control Board. These standards, equivalent to the Euro standards, are implemented in phase-by-phase manner. The current standard, Bharat III, was implemented nationwide in 2010 and in light of worsening pollutions most major cities have transitioned to Bharat IV. Bharat IV is expected to take effect nationwide as of April 2017. Further it has been announced that India will transition to Bharat VI directly in 2020, to address the situation more aggressively. With regards to emissions from stationary sources regulation has moved forward at significantly slower pace. The current standard in place today is based on the Environmental Protection Act of 1986, with rather sporadic updates. In 2015, the government took first steps to establish stricter regulation by proposing a new standard for limiting pollutants.

India's population was estimated to be over 1.2 billion in 2015, making it the second largest in the world. The population is growing steadily and forecasts suggest that by 2022 it will surpass China to be the world's most populous country. More than 50% of India's population is below the age of 25 and GDP per capita on PPP basis was approximately 6,100 international dollars. While this is relatively low, the vast young population and strong projections for growth suggest an increasingly consumption driven middle-class. Unlike China however, income inequality in India has been better managed and its Gini coefficient of 0.34 (2012) is comparable to that of more developed economies. A Gini coefficient of 1 would imply complete inequality. More inclusive growth is key to human development and is generally also considered to be positive for consumption levels.

Unusual for developing economies a large part of India's recent growth has been dominated by a thriving services sector. Generally developing economies transition to industrial economies where manufacturing takes the center stage to then transition into a more developed services-based economy. As a result of India's leap into services its industrial and infrastructure sectors have been underdeveloped and this is something the government is trying to rectify, through its *Make in India*

programme. The programme encourages both MNEs and domestic companies to take up manufacturing and infrastructure development in the country across 15 major sectors, through more open FDI norms, reduced red-tape and the establishment of strategic corridors for growth. The government is also keen to foster innovation and is, as a part of the programme, taking several initiatives at the legislative and policy level to strengthen the protection of intellectual property rights.

4.1.2.3. ASEAN

The ASEAN free trade area is a trade agreement between ten countries supporting local manufacturing in all ASEAN countries. The countries considered in the ASEAN region are Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam. The GDP on a PPP basis of these countries amounted to 6,500 billion international dollars. Excluding Singapore, the region is expected to have a combined GDP growth rate of 4.8% in 2016 and 5.1% in 2017. Within the region, trade is increasing due to reduction of tariffs. However, non-tariff measures remain a challenge to spur further growth in trade. Moreover, best practices for policy making are shared between the ASEAN countries, which have facilitated transactions made within the region. In recent years, the slowdown in the economic growth of China have affected the ASEAN region, as investments have declined as well as the export demand. One of the reasons is the integrated supply chains that have been built up in China and the ASEAN region. FDI inflows from China into some countries have increased rapidly since 2009, but are now expected to decrease.

As a result of the varying degree of development in ASEAN member nations, regulation on emission control from mobile sources varies significantly but still lags behind the current standard in Europe – Euro VI. The standards in place today in the ASEAN region range between Euro II and Euro IV. Though fuel consumption in the region is lower than that of China or India, it is expected that the number of vehicles per thousand people will continue to be greater than either of those nations for the coming two decades. There are indications that the region will therefore gradually update emission standards to limit the level of pollutants from emissions. Regulation and implementation however appears to be at the jurisdiction of each member nation, with non-governmental organizations such as Clean Air Initiative Asia helping the region as a whole to work towards reduced pollution. With regards to emissions from stationary sources, regulations appear to be in place at a national level among the member nations and there is an ongoing collaboration between public and private actors to limit pollution.

The population of the ASEAN region was an estimated 630 million in 2015, with Indonesia amounting for the largest share of approximately 40%. ASEAN is therefore more populated than the EU or North America, and is home to the world's third largest labor force after China and India. The region is largely characterized like India by a younger demographic, while certain more developed member nations like Singapore and Thailand are beginning to see an aging population. ASEAN is further characterized by great economic and social diversity. Singapore's GDP per capita in terms of PPP is almost 12 times greater than that of the Philippines, comparable to the most developed of economies. The standard deviation in average incomes among ASEAN countries is more than seven times that of EU member states – the degree of human development therefore varying significantly across the region. Generally, however there has been a steadily improving GDP per capita and declining poverty. An estimated 67 million households in the region today qualify to be a characterized as "consumer class", with sufficient disposable income to make discretionary purchases. This number is expected to grow to almost 125 million households in 2025. The region also faces significant socio-cultural differences, be it language, cultural norms or religion, and this translates to rather different consumer preferences and sensitivities. Indonesia is home to a pre-dominantly Muslim populace, while Philippines is largely Roman-Catholic and Thailand, Buddhist.

In line with its economic development and growth ASEAN has attracted significant FDI, home to 227 of the world's largest companies (revenues exceeding $1 billion USD) as of 2010. The region is also increasingly growing and expanding local businesses, accounting for 38% of the market for initial public offerings in Asia. Improving efficiency has been a major focus in the region with almost 60%

of total growth since 1990 a result of productivity gains across industrial sectors. With activities that span trade, manufacturing and services, developing human capital and workforce skills of its large labor force is now a focus area. Innovation however seen little growth, with most industries in the region described to be consumers rather than innovators of technology. For perspective, in 2010 the number of resident patent applications filed in China was greater than in ASEAN by a factor of 70. The limited R&D activity of the region is bound to have long-term consequences, perhaps anchoring its growth.

4.1.3. Industry Specific Factors

4.1.3.1. Oil Refinery Catalysts

Catalysts used in oil refinery containing colloidal silica are used in multiple processes, including fluid catalytic cracking (FCC), hydrocracking and isomerization (Fig. 9). In these processes, larger hydrocarbon molecules are broken down into lighter, smaller molecules by applying heat, pressure and a catalyst. The combination of different temperature, pressure and catalyst provides a different path leading to a desired end product.

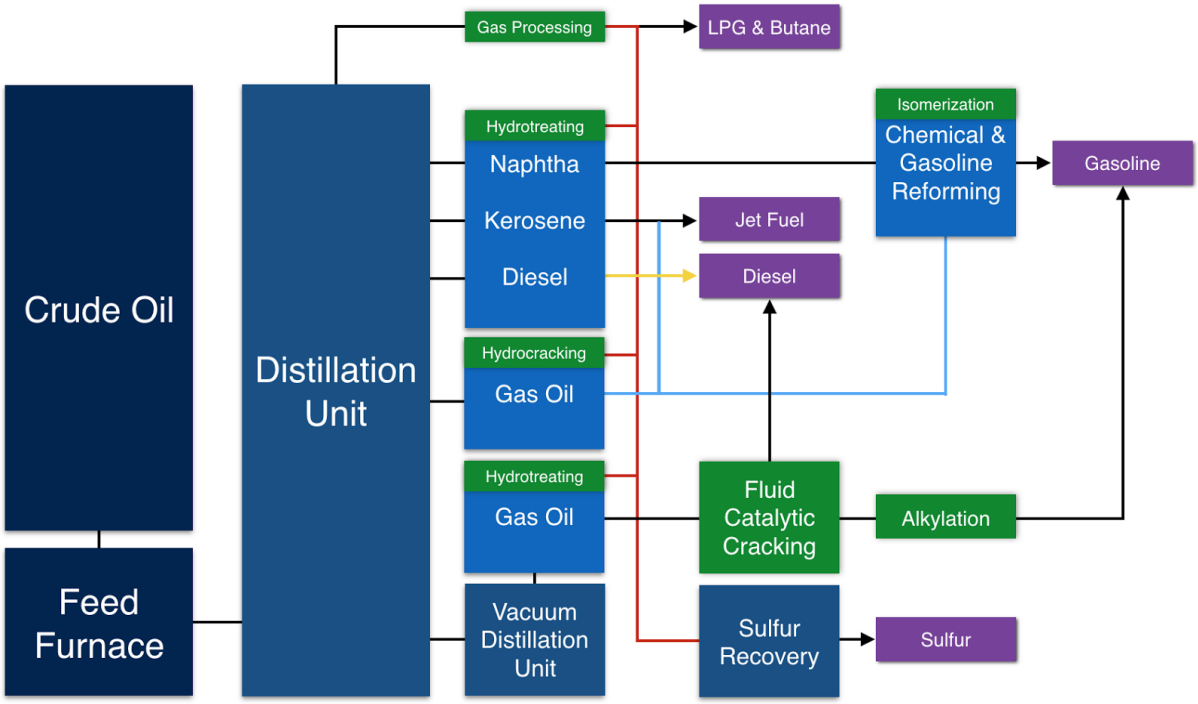

Figure 9: Simplified view of the oil refining process

Another function of oil refinery catalysts is to remove contaminants such as sulfur and metals from the feedstock. Sulfur is a naturally occurring component of crude oil. When fuels with high sulfur level are burned, sulfur dioxide is emitted and has been recognized as a major cause of air pollution and acid rain. Emission control catalysts used in vehicles to reduce emissions, which is described below, require low sulfur fuels to perform well. The increased use of emission control catalysts in vehicles is a driver of demand for oil refinery catalysts along with tighter environmental regulations, which has been introduced worldwide to reduce sulfur content of fuels (Yoneyama et al., 2013). Consequently, oil refiners are experiencing regulatory pressure that involve technological challenges to improve efficiency and produce cleaner fuels.

Oil refinery in itself is part of the greater oil production and distribution value chain, characterized by a high degree of vertical integration, where giant multinational oil and gas enterprises over time have developed significant expertise over the refining process including oil refinery catalysts (Yoneyama et al., 2013; McWilliams, 2015). These enterprises, typically through technology licensing arms, license rights to the catalyst manufacturers who are integral to the refining process. According to Yoneyama

(2013), consolidation is expected as the industry is characterized by overcapacity and pressure from customers to reduce costs. Refinery catalyst production has in recent years become a mature market in developed countries. The major growth is seen in emerging countries, where demand for vehicles is increasing drastically and lags behind in terms of regulation of emissions (Yoneyama et al., 2013). It is expected that cleaner fuels will be required globally as regulation in emerging countries is hardened to levels of developed countries.

China

Almost all oil refining activity in China falls under the umbrella of three large, state-owned enterprises. These actors operate in a vertically integrated manner and are greatly involved with the production of catalysts for oil refining, where they together hold a 90% share of the total market. Both these actors have invested in in-house R&D to develop new catalysts. Due to tighter regulations on fuels, the industry has gained much growth momentum. This is also a result of the heavy and inferior feedstock that originates from China. Further, oil refineries have increased capacity to meet domestic demand. At the same time, China has disregarded the excess capacity available in nearby countries such as Korea and Japan, which are experiencing a decline in demand. Although China has shown a willingness to adapt to slowing domestic growth by postponing new projects, it may not be enough to solve over capacity within the region more broadly in the long-term. However, it is not unlikely that the delay of new projects is caused by the implications of vertical integration, as revenues from upstream operations have taken a turn as a result of the price of oil. Thus, the reasons for delays in new projects can be explained by financing constraints rather than shifts in demand.

Looking at a five-year span, there are many new independent catalyst manufacturers that have entered the Chinese market. The domestic catalyst suppliers post a challenge to new entrants. Western companies need to prove their capabilities by providing high quality products, continue with new product introductions and provide after sales services. New technology drive demand, and by demonstrating increased performance and yield advantages international players can compete with the regional giants.

India

India is expected to overtake Japan to become the world's third largest oil consumer behind China and the US by 2025. It is today the second largest refiner in Asia, after China. A net importer of crude oil, India has interestingly become a net exporter of petroleum products through a string of investments in refineries intended for export. Changing government policy in the sector, allowing for 100% foreign direct investment (FDI) in several of the downstream segments has been a major contributor, opening up the market to better serve demand while also reducing to an extent the red-tape involved. The upstream segment – exploration and production – remains largely in the control of state-owned oil and natural gas corporations, them accounting for approximately 68% of total Indian oil output in 2014.

The opening up of downstream segments is well reflected by the increasing market share that private players Reliance and Essar have been able to capture in a relatively short time frame. Joint-ventures are now also of increasing importance, the industry seeing more public-private partnerships. Private and joint venture companies own about 44% of total capacity.

IndianOil, a state-owned enterprise, is India's flagship national oil company. It is completely vertically integrated with operations spanning the whole hydrocarbon value chain. IndianOil and its subsidiaries maintain control of 11 of the country's 23 refineries – almost 25% of the national refining capacity. As one of the largest petroleum companies in the world in terms of revenue, it is a major consumer of catalysts, becoming increasingly R&D and in-house production oriented. The company has incorporated a joint venture together with Int Ercat called Indo-Cat, which focuses on FCC catalysts. The jointly developed catalysts is called "IZV series", and is now marketed to other actors in the industry.

The largest oil refinery company in India is Reliance Industries, holding a market share of 28% of total refining capacity, also have local production and conduct research in the field to develop new catalysts. Reliance Industries merged with Indian Petrochemical Corporation in 2007, which operated one catalyst plant in Vadodara. However, at present Shell supply Reliance with hydroprocessing catalysts. Of the multinational actors, Johnson Matthey and Clariant through their brand SüdChemie India maintain local production sites. These actors do not limit their production to FCC, but manufacture catalysts for FCC, hydrocracking and isomerization. However, the production capacity of these actors is not publically stated, making it difficult to estimate the potential market size for colloidal silica in this region without making farfetched assumptions.

ASEAN

As of 2012 ASEAN maintained a combined refining capacity of approximately 4.8 million barrels per day (MBPD), making the region the world's third largest refining geography after China and Russia. In ASEAN, Singapore accounted for the largest share of this capacity at 1.3 MBPD, followed by Indonesia and Thailand with 1 MBPD each. Malaysia follows with a capacity of approximately 0.6 MBPD, and Vietnam maintains one operating refinery with a capacity of 0.13 MBPD.

ASEAN has been a net importer of oil since the mid-1990s. Oil, primarily diesel and heavy fuel oil, accounts for 37% of the region's primary energy mix with demand at approximately 4.4 MBPD. Local production meets about half of this demand, with 2.5 MBPD produced in 2012. The region's refining capacity thus seems to be in tune with domestic demand with no indications of overcapacity. Further, forecasts suggest that the region's oil demand is set to grow to 6.7 MBPD in 2018. In line with this increases in refining capacity of almost 1.3 MBPD, or 27%, are expected during this period. Consumption of refining catalysts in the ASEAN region is therefore set to see continued growth going forward.

The oil refinery industry in Singapore is dominated by multinational players such as ExxonMobil and Shell, which have 80% of the refining capacity. These players develop their own catalysts in-house that are imported. The third largest refinery, Singapore Refining Company (SRC) is a joint venture between Singapore Petroleum Company and Chevron. Since Chevron is a large catalyst manufacturer, it can be inferred that their catalysts are supplied in-house. The Thai oil refineries do not possess in-house production capabilities of catalysts. It is likely that they import their catalysts, although the source is unknown. Petronas of Malaysia is supplied by Axens, which have manufacturing in North America and the Middle East. Thus, catalysts are imported. The only refinery of Vietnam, Petrovietnam, is supplied by W.R. Grace, who also manufacture their own colloidal silica. Clariant maintain the only known site for local production of refining catalysts in Indonesia.

4.1.3.2. Catalysts for Production of Petrochemicals

As a part of the greater oil production and distribution value chain, petrochemicals are derived from petroleum. In line with the high degree of vertical integration the industry sees, multinational oil and gas enterprises are also very active in the production of petrochemicals including catalysts for production of petrochemicals. Catalysts are vital to the production of petrochemicals, giving the process the yields and conversions needed for economic viability.

Colloidal silica can be used as a support material for acrylonitrile and acrylic acid catalysts, resulting in the production of numerous intermediaries including fibers, plastics, rubber and acid. Typically, catalysts are in the reactor or added to the feed, moving through the process until separation. The catalyst to feed proportion is always low – petrochemical processes require relatively low volumes of catalysts in contrast to the volumes of feed passing through.

The intermediaries produced have a very broad range of applications, vital to commercial products we use today. As a result of their widespread usage, growth in demand is reflected by the high growth in GDP in emerging markets (Yoneyama et al., 2013). This implies growth in demand for the

acrylonitrile and acrylic acid catalysts, and in turn growth in demand for colloidal silica. As the intermediaries produced are in many ways fundamental building blocks that cannot be easily replaced, one can expect growth to see a general trend upwards in the long term with fluctuations around this trend in short term.

China

Unlike the oil refining segment, production of catalysts for petrochemicals in China is significantly more market oriented with hundreds of active companies. These companies are generally small and highly localized, their role limited to production. The general absence of larger domestic catalyst producers can in part be explained by China seeing imports of petrochemicals from international suppliers as a less risky option than increasing dependency on feedstock imports, such as crude oil or naphtha, to the levels that would be needed for self-sufficiency.

To meet expected growth in consumption and the level of technological and product development needed to facilitate it, many of the smaller producers are consolidating in an attempt to form larger and more competitive, research and development oriented organizations.

Several multinational players have also established state-of-the-art plants in China to scale operations in the region and take part of the lower labor and capital expenditure costs, increasing their competitiveness both globally and over the local small-scale plants. Further investments in new capacity to meet increasing demand are expected to continue.

India

Production of petrochemicals is a significant industry to the Indian economy. The industry is striving for self-sufficiency and so investing heavily in bulk petrochemical capacity. The market for basic petrochemicals is expected to see a compounded annual growth rate of 11%, growing to USD 40.3bn in 2019. Demand is expected to be driven by the olefins segment. If the Indian economy can sustain growth at these levels, demand for petrochemical intermediates such as acrylic acid, acetic acid and propylene oxide – and the respective catalysts that they require – will grow proportionally. Investments in the production of these intermediates however appear to only meet a fraction of this demand, suggesting a shortfall of as much as 25 million tons in 2025.

While exports of petrochemicals have grown at a higher rate than imports between 2010 and 2014, India remains today a net importer. It is unlikely that this changes significantly in the near future. Large ethylene capacity additions – in the order of an additional 9 million tons – will take place in the Middle East by 2019. The region is ethane rich and ethane based petrochemical products are cheaper than those made in India, meaning domestic producers are expected to face margin pressure. This lack of cost advantage makes exporting from India unattractive.

Today India imports approximately 11 million tons of petrochemical intermediates annually – 45% of its requirements. Demand for intermediates is expected to grow to between 33 and 38 million tons annually by 2025. Despite these projections, international producers of petrochemical intermediates – and thus the main consumers of colloidal silica – have so far opted to meet demand by shipping product to India. In addition to the cost advantages involved with doing so as previously mentioned, other factors such as the extensive bureaucracy involved with setting up production in India and a tariff structure where tariffs on imports of precursors to intermediates are higher than for intermediates themselves all contribute to the fact that international producers continue to ship product to India.

Many of the actors active in the oil refinery catalyst industry is also found in here. The two multinational players, Johnson Matthey and Clariant through their brand SüdChemie India, have local production in the region, supplying petrochemical catalysts for the domestic market. Also the large conglomerate Reliance Industries are active in this field. As in the case of oil refinery catalysts, production capacity of these actors is not publically stated, making it difficult to estimate the potential market size for colloidal silica in this region.

ASEAN

The ASEAN region is a net importer of petrochemical catalysts and has consumed an increasing amount of catalysts for a wide range of uses. This growth has been a result of the region's rapid modernization and the increasing consumption of the large population within the region. The landscape is changing however. Due to large capacity expansions in China, actors that are active in the production of petrochemicals in the ASEAN region are at a cost disadvantage. Looking forward consumption of petrochemical catalysts may therefore not experience the rapid growth of the past. Although, the demand for catalysts is growing, the supply is expected to mainly originate from outside the region.

To tap into the growth in demand, local manufacturers of petrochemicals in ASEAN must adapt to the changing competitive environment and market conditions, driving down their feedstock costs and improving their operational performance. International players do not appear to have established a larger manufacturing presence in the region, with Clariant maintaining the only known production site in Indonesia.

4.1.3.3. Catalysts for Production of Sulfuric Acid

Sulfur is ranked as one of the most important elements for industrial purposes, through the use of sulfuric acid (Apodaca, 2015). It is of major importance in sectors of the manufacturing and fertilizer industries. The main use of sulfuric acid is for making phosphate fertilizers, such as ammonium phosphate, but is also used to produce other fertilizers and a large number of other chemicals.

Sulfur is one of the byproducts of oil refining and natural gas processing. The function of oil refinery is to remove contaminants such as sulfur and metals from the feedstock. The United States Geological Survey estimates that about 90% of all sulfur are produced from recovered sources (Apodaca, 2015). Thus, the production of sulfuric acid is more correlated with the demand for fuels and petroleum products rather than with demand of sulfur itself. The most common method for production of sulfuric acid is the contact process (Fig. 10). The process makes use of a Vanadium Pentoxide catalyst, where colloidal silica can be used as a binder.

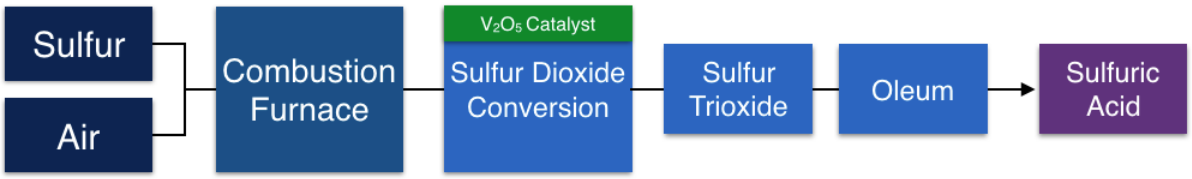

Figure 10: Overview of the contact process

Tighter regulations worldwide to reduce further pollution of the environment has had a positive effect on sulfur recovery from refineries, in turn driving production of sulfuric acid. Monitoring growth in oil refinery activity can therefore serve as a suitable indicator of the prospects for production of sulfuric acid, and thereby the potential for growth in colloidal silica demand given its use in Vanadium Pentoxide catalysts (Apodaca, 2016).

China

China is today the largest producer of sulfur, with an estimated 12,000,000 metric tons produced in 2014. Due to the national fuel standards, the recovery of sulfur is expected to increase further in the coming years as the standards are implemented. By 2017, the limit of sulfur content is set to no more than 10 ppm for both diesel and gasoline. The end uses for sulfuric acid are phosphate fertilizers, which stands for approximately 66% of the total demand and industrial uses, which stands for the other share.

The catalyst used for production of sulfuric acid is vanadium pentoxide. The vanadium pentoxide industry is highly concentrated and dominated by two large domestic steel companies. In 2015 89,577,000 tons of sulfuric acid was produced in China. Vanadium Pentoxide saw total production of 86,070 tons that year, of which approximately 5% or 4,304 tons was for the catalyst needed for the contact process to produce sulfuric acid.

India

Production of sulfuric acid has been very volatile in India over the last decade. The current annual production is estimated to be in the order of 5.5-6.0 million tons. It is known that there have been as many as 140 sulfuric acid plants in the country with an annual installed capacity of about 12 million tons. In line with the volatility market conditions however a number of these plants have been closed down in the recent past. Further, it can be assumed that the majority of these manufacturers are small and cater to very local, regional markets in the country.

With regards to the catalysts needed for production of sulfuric acid, international players appear to have by large not tapped into this market, with only one known actor maintaining a production plant in the country catering to both domestic and export markets. A number of local producers are also present in this area however catalysts are not core to their business.

ASEAN

No significant production of sulfuric acid activity was found for the region. None of the ASEAN members feature amongst the world's top 24 sulfur producers, who account for 94% of total production. This is not expected to change in the near future, with forecasts suggesting the region will have no impact on the global supply of sulfur up to 2017. Activity, even if present, can be assumed to be of negligible interest.

4.1.3.4. Emission Control Catalysts

The problem of air pollution has been one of the top priorities for countries around the world to solve. Emission control catalysts are used in two main sources of air pollution; mobile sources and stationary sources (Fink et. al., 2011). Mobile sources include engines for vehicles as well as handheld utility machinery, while stationary source include manufacturing plants, power plants and mechanical sources of air pollution such as metal smelters and wood processors. For mobile sources, the catalyst manufacturers generally supply the exhaust line manufacturers with catalyst coated substrates for the products, who then supply the automotive manufacturers. The value chain of the stationary sources is similar, where the catalyst manufacturers apply the catalyst to the substrate, which is then used in the areas mentioned above.

For catalysts in mobile sources, colloidal silica is strictly used in diesel engines, as the temperature of the exhaust in gasoline engines is too high. Catalysts for mobile sources convert combustion gases from diesel powered vehicles into carbon dioxide, nitrogen and water through the use of catalytic converters (Fig. 11). Catalytic converters make use of both reduction catalysts and oxidation catalysts, which are parts of a diesel engine.

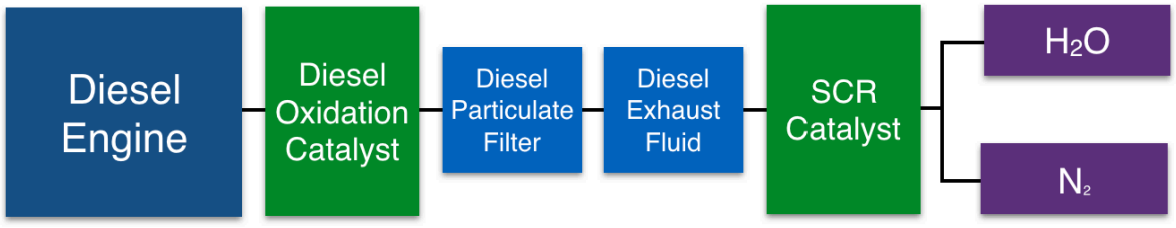

Figure 11: Overview of how catalysts are used in a diesel engine

The demand for emission control catalysts for the mobile segment is a function of automotive sales and stricter regulations (Fink et. al., 2011). The importance of emission control catalysts has increased due to measures to combat air pollution. Furthermore, demand is driven by increased production of vehicles in developing countries.

The SCR process was originally developed for emission control at power plants, marine applications and other stationary diesel engines. It's now also used in different chemical and industrial processes as well as oil and gas-fired boilers and turbines. The SCR process is used to reduce nitrogen oxides, which have been associated with acid rain and ozone formation (Fink et. al., 2011). As the main use of emission control catalysts for stationary sources is power plants, the demand for these catalysts vary depending on the source of energy consumption within a region. As an example, in a country consuming energy from primarily non fossil fuel sources such as nuclear and renewable sources there is low demand for emission control catalysts. The demand for emission control catalysts for the stationary segment is a function of energy composition of a region, increasing demand for power, and stricter regulations on the sector.

China

Approximately 98% of the domestic market consists of gasoline fueled vehicles, meaning that the market for colloidal silica is limited to commercial vehicles, which use heavy duty diesel (HDD) technology. 3.4 million commercial vehicles were produced in 2015, and has seen a decline of -3.41% CAGR since 2011. The consumption of catalysts for the segment of mobile sources is to a large extent a function of vehicles produced within the country. Looking at the consumption of catalysts for mobile sources, it can be inferred that the catalyst consumption is correlated to the production in vehicles.

There has been an inflow of capital over several years in the region, as stated in the annual reports and accounted as capital expenditure by the major international players. As more vehicles have been manufactured in the region, catalyst manufacturers have expanded their capacity to meet the increase in demand. Multinational catalyst manufacturers have established a firm presence in the market and account for the majority of the market share in China.

Looking at the market for SCR catalyst for stationary sources of emission, the main end-use industry is fossil fuel-fired power plants. China is the largest producer and consumer of coal, which comprised of 66% of China's energy consumption in 2012. This amounts to 35 percentage points higher than the world average. However, the output of the coal industry has been in decline since 2014, due to slower growth of the economy but also measures by the government to reduce pollution. This can be interpreted as the start of a longer going trend as coal is losing market share to cleaner alternatives such as hydropower.

The industry for emission control catalysts for stationary sources is a bit less concentrated compared to mobile sources. Four actors hold 60% share of the total market. Among these are one multinational, one joint venture between German and Chinese companies, and two large domestic players, which license the technology from foreign companies.

India

Production of light and heavy duty vehicles have increased a lot since the early 2000s in India. The CAGR between 2011-2015 for light duty vehicles was 2.67% and -4.19% for commercial vehicles. India, in contrast to China, has embraced diesel technology, which market share was around 50% in 2014 for light duty vehicles. The market is dominated by multinational players, who has continuously increased domestic capacity to meet the increased demand from the vehicle industry. The majority of the players are located in an automotive industry cluster in the south of India. Further capacity expansions are planned, which is stated in the annual report of one of the larger multinational players. Approximately 2 million diesel fueled vehicles were produced in 2015.

Pollution from thermal power plants is today a major concern in India. A recent study showed that 90% of all coal-based thermal power plants performed poorly in terms of pollution compared to counterparts worldwide. Part of this is answered by the fact that there is no direct regulation on NOx emissions from coal-fired power plants. Regulations on emissions from stationary sources are set by the government and the current standard is based on the Environmental Protection Act of 1986, with rather sporadic updates. In 2015 the government took first steps to increase regulation, proposing a new standard for limitation of various pollutants. With regulations in place, the coal-fired power industry is expected to be one of the largest consumers of SCR catalysts and associated services. The final regulations and compliance deadline is expected to be decided upon shortly.

ASEAN

By fuel type, the Light Duty Vehicle market in ASEAN is largely biased towards gasoline. Of greater interest to emission control catalyst manufacturers is therefore the Commercial Vehicle market, which generally is biased towards diesel. While this market has also seen a downturn since its peak in 2012, it saw growth of 1.9% between 2014 and 2015.Within ASEAN, Thailand accounted for approximately 71% of commercial vehicle production with a recorded output of almost 1.2 million units in 2015. The second largest producer is Indonesia, accounting for approximately 17% of commercial vehicle production with a recorded output of 275,000 units in 2015.

The majority of emission control catalyst manufacturers are located in Thailand, where production of commercial vehicles is centered in the ASEAN region. Multiple multinational companies have plants in Thailand. An additional multinational actor has entered the region and is constructing a plant, where production is expected to start in the fourth quarter of 2016.

Forecasts suggest that ASEAN's energy demand will grow 80% between 2015 and 2035. In the power sector, coal is expected to emerge as the energy source of choice for electricity generation going from less than 33% today to almost 50% in 2035. This is driven by the relative abundance of coal in the region and its affordability. The increase will take place largely at the expense of oil and gas. The transition is already underway – almost 75% of future thermal capacity under construction today is coal-fired. As per the new policies in the region supporting this transition to increased coal dependence, demand for energy from coal is expected to see growth of CAGR 4.8% up to 2035.

Regulations are put in place on a national level and there is an ongoing collaboration to combat pollution between public and private actors. Emission control catalysts for stationary sources appear to be imported, as the public actors form partnerships with foreign companies with experience and technologies in the field. There are recorded installations of SCR catalysts in thermal power plants in Thailand, which is a good indicator that regulations are being enforced in the ASEAN region.

4.1.3.5. Competition

China

In high value-added industries, such as catalyst carriers, colloidal silica of high quality is required. Historically, China has imported high-quality colloidal silica from Germany, America and Japan to meet demand from its domestic high-end industries. In 2014, approximately 9,000 tons of wet based colloidal silica was imported, of which Grace and AkzoNobel accounted for 61%. Looking forward however it is expected that China will rely more and more on domestic suppliers, posing a threat to exporters to the market. Local actors are becoming increasingly better at managing production processes and are able to deliver mid to high quality colloidal silica, offering not only a cost advantage but also lower lead times over imports.

India

The majority of local colloidal silica manufacturers in India do not cater to the catalyst segment. It is estimated that 90% of colloidal silica is consumed by the precision investment casting and refractory

segments. These segments are place less emphasis on quality and are price sensitive, making them well suited to local manufacturers and their current facilities and capabilities. As of 2013, 18,500 tons of colloidal silica was produced in India. An additional 1,000 tons was imported for intended use in the more quality conscious applications, such as catalysts. At present no international players produce colloidal silica in India, but as the market develops and the demand for higher quality increases this is expected to change. Indicative that this shift is already beginning to take place is a noticeable trend where certain local manufacturers have begun diversifying into the higher grade colloidal silica segment for use in the catalyst application.

ASEAN

Status and activity of domestic colloidal silica manufacturers in the ASEAN region is unclear, with limited to no information available. As observed however, ASEAN has limited domestic production of catalysts which supports the limited presence of colloidal silica manufacturers.

4.2. AkzoNobel

4.2.1. Context

Colloidal silica is still a small business under the AkzoNobel umbrella, which is reflected in the lean organization that operates the business (Fig. 12). Some functions are shared over the whole Pulp and Performance Chemicals business unit such as Human Resources, Strategy, Integrated Supply Chain, Finance and Business Intelligence. Other functions are shared over the sub-business unit Performance Chemicals, such as operations and Research, Development and Innovation (RD&I). The colloidal silica business has its own sales and marketing unit which drives commercialization, corresponding to the value capture function of a business model. Further, this unit also include a Colloidal Silica R&D department, which reports into the sub-business unit of Pulp and Performance Chemicals, Performance Chemicals R&D department. The business invests heavily in R&D, with the focus on developing existing products but also developing new products for new markets to sustain growth and meet the financial targets of the business.

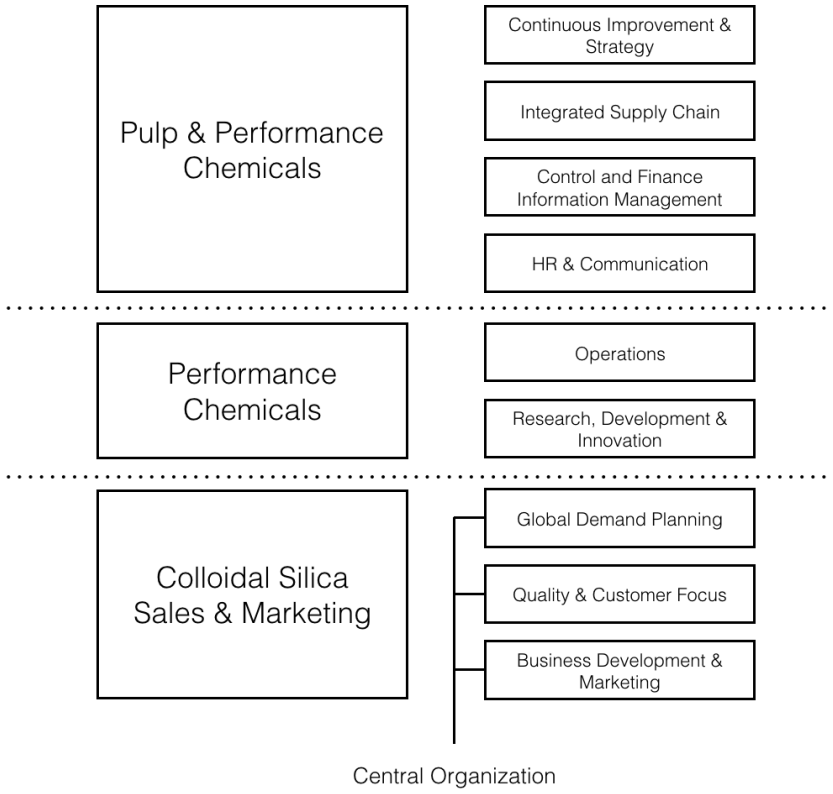

Figure 12: Simplified illustration of the organizational structure

Within the Colloidal Silica Sales and Marketing unit, there is the Director of Sales and Marketing, who has global responsibility for the colloidal silica product line. Reporting to the director is the functions of Global Demand Planning, Quality and Customer Focus and Business Development and Marketing as well as the sales managers for each regional segment. The Business Development and Marketing function include technical and commercial specialist whom are responsible for specific product segments. The technical specialists support the sales personnel with technical sales issues, related to how the product can function in the product of the customer, while the commercial specialists gives commercial support such as pricing and sales strategy. Direct sales offices are located throughout Europe and North America along with distributor networks to multiply the customer base. In Asia a similar approach has been initiated, with direct sales offices in China, India, Taiwan, South Korea and Japan. Several relationships with distribution partners have also been established to increase penetration in the region.

4.2.2. Assessing Growth Opportunities

AkzoNobel use their global presence to transfer the gained expertise from operating in mature markets to developing markets. Business cases of AkzoNobel's sales and operations in Europe and the US are studied to see how they can be applied to new emerging markets in Asia. Applications where AkzoNobel have already demonstrated advantages in developed markets help convince new customers in emerging markets to a certain extent. The transfer of expertise and manner of operating to develop business in emerging markets is not always seamless however. This was evident in the past when AkzoNobel were unable to transfer the concept of their Coatings business from Europe to Asia, stressing the importance and need to conduct an in-depth market study to better understand customers and the dynamics of the markets before attempting entry.

Business Intelligence (BI) at the Pulp and Performance Chemicals business unit is being continually developed and improved. BI focus on gathering external information on market conditions and monitoring competitor and customer activity. The BI team is small and primarily serve management with input. Communication with other functions in the business unit takes place primarily through participation in cross-functional projects and the sharing of information on AkzoNobel's internal portal. BI take on ad-hoc requests from within the business unit when further research on a given topic is required. With regards to emerging markets in Asia, particularly Southeast Asia, little intelligence has been developed thus far.

"It's about doing teamwork. Not working in silence… You can never network enough. You don't have time to network with everyone as much as you should. So I think big sales meetings, where you meet face to face is really important to get to know each other."

Currently the responsibility of developing intelligence on these emerging markets in Asia mainly lies with the local sales teams present there. These sales teams have been recently established, are small and are inexperienced relative to their peers in developed markets. As an application area of interest emerges in a given market, in-house specialists such as the Business or Technical champion are reached to for commercial and technical support. AkzoNobel maintain relatively few technical specialists in Asia, these regional offices taking contact instead with the in-house specialists in developed markets as required. It is also the role of these specialists to facilitate more cross-functionality and they are responsible for the spreading of information through the organization, increasing communication between regions.

BI compile information found from the sales teams by conducting quarterly interviews – a procedure that is part of the BI Network Process. Analyzing competitor activity is an important part of AkzoNobel's assessment of the potential in a new market. Uncovering information on competitor activity in emerging markets is described to be very challenging. In comparison to developed markets where there is greater transparency and disclosure of information, competitors in emerging markets are often privately held, disclosing little to no information. The markets are also inherently dynamic with

several new competitors emerging. The organization stresses the importance of "pre-marketing" – being able to investigate the country, industry structure, and the organization and activities of small to mid-sized industries – to help shape potential market entry.

"Disclosure of information [in developed markets] is much greater and you are only as good as the information that is disclosed. You can have the better analytical capabilities, the best of what you want, but your result is only as good as the data that you put in."

The assessment of market findings takes place through a project format. These projects are aligned with the strategy of the business unit and involve members from different function including management, BI, sales and marketing, to determine how to proceed with a given market. The projects assess the compiled information, to understand what others have done in the market, if it can be replicated and the opportunities for growth present. The decisions taken are driven by management, with input from the other functions involved in the project. Active discussion is encouraged to create awareness on the status of the competitive environment from everyone in the organization. If it is found that a market holds sufficient potential focus shifts to entry strategy, dictated by the overall strategy of the business unit and the manner in which the market is developing.

In line with this a business plan is made where a positive, neutral and negative cases for involvement in the market are presented to management. There are typically two positive cases – one which favors acquisition led growth and one which involves entering a new technology platform. The neutral case focuses on organic growth in the market. The negative case also does this, albeit with a higher risk factored in. The spectrum of cases aims to provide management with a more complete picture of the possible opportunities and outcomes in the markets being evaluated.

"I would say that if there is one area that I wish we had more resources to dive in it is the customers. As it is today we are working more on competitors than customers."

The want for more resources to dive into customers has been acknowledged at the organization. Certain characteristics are more prevalent to emerging markets in Asia than to mature markets. AkzoNobel observe a general market perception of high quality by virtue of being an MNE. Conversely, these markets are also very price sensitive. As a result of this there has been an observed shift within the region, where local producers are relocating out of China to countries like Vietnam in ASEAN with the intention of driving down costs even further. AkzoNobel find that customers in the region are also prone to requiring rather extensive technical guidance and assistance – a challenge given the fact that few technically skilled employees are present in the region. This stems from customers, particularly smaller organizations, not having in-house R&D capabilities.

"The dynamic situation, it's happening so fast in Asia. It is challenging to say the least… the help of someone local is quite key."

Emerging markets generally also pose certain legislative challenges, as has been observed by the organization. To exemplify, regulation in China has been described to be more complex than in mature markets, with a tendency to interfere more on a micro-level which can change the industry structure or alter competition, at times to favor domestic players.

4.2.3. Entry Strategy

4.2.3.1. Expanding with or leveraging relationships with established customers

There is no general approach to enter new markets for AkzoNobel, where the strategy is determined on a case by case basis. An initial step can be to follow an established customer who is expanding into a new market and supply with exports there. The company encourages their customers to invest in foreign markets, and are committed to follow them in their expansion. This process is adept when the customer has a centralized purchasing function, as the case could be made that the customer would

benefit from not only using colloidal silica in their home markets in Europe and the US, but also in the emerging markets that they are expanding into. However, this is assuming that the customer uses the same technology throughout its operations, which is not always the case. As emerging markets are subject to different regulations, the performance parameters of the product differ. Thus, different technologies are sometimes used. The heterogeneous technology landscape adds a dimension of complexity to customer development and the formation of a viable entry strategy. In the case where an existing multinational customer already is present in an emerging market, but has decentralized purchasing, the sales process is similar to that of engaging a new customer.

4.2.3.2. Approaching Distributors

An alternative scenario is where AkzoNobel uses distributors as a first step to enter a new market. In the context of entering emerging markets, the organization sees working with distributors as a useful resource to help with understanding market characteristics and assessing market potential while maintaining relatively low depth of involvement and thereby risk. Local distributors are already familiar with the manner in which business is conducted in the region. That said, AkzoNobel stress that working with distributors to understand a market alone is not a sufficient basis for growth – the organization must also conduct their own investigation of market potential.

AkzoNobel is very selective when choosing distributors to partner with. Distributors that are open, allowing the organization to take part in customer interactions when necessary, are favored. The organization likes to schedule visits out to distributors every second year and meet with their customers. Distributors that are conservative and like protect themselves from potentially losing customers to direct sales with AkzoNobel can be very challenging in the long term, particularly if a greater depth of involvement in the market is to be undertaken. It is further stressed that AkzoNobel seek more than solely transactional distributors – they seek distributors that are keen to grow the business, can understand customer requirements and handle their offerings technically. Distributors can be divided into two general categories, specialized and regional distributors. Specialized distributors have technical expertise of one segment, and regional distributors serve several segments in one region. Distributors act as an extended arm to AkzoNobel, and therefore has to be managed. The distributors are given training and material to support them in their daily operations. Further, guidelines are being set up for the distributors to enable them to use the AkzoNobel brand.

"We are not just looking at transactional distributors, we are clearly looking at distributors who can handle the product technically and can engage in detail, talk to the customer about the technicalities of the product and understand the requirements."

Transparency of the distributors is an important issue as it enables AkzoNobel to know their customers. Knowing the customers and the market is essential to the company as it decides to increase its level of involvement in the market. The growth that is reachable through distributors is limited as colloidal silica is a technical product, and technical competency is essential to the sales function. Therefore, the technical competency of the distributor is an important factor. However, distributors have their own portfolio and also supply for other companies, which makes their involvement with colloidal silica customers limited.

4.2.3.3. Organic vs Inorganic Growth

The focus of the organization over the last years has been to grow organically. Since colloidal silica is labeled as a growth business within the conglomerate, it is given resources to invest in inorganic growth also. This means that foreign direct investment is an option for the company, but mainly entail investing in new production capacity. In 2011, the company built a new plant in China to serve the Asian market. The current focus is to bring production capabilities up to standards of European plants. Having a local plant has been an important part of the entry strategy as it allow shorter lead times to serve the growing demand of the Chinese customers. A consequence of the dynamic nature of emerging markets is that customers do not plan their orders to the same degree as customers in

developed markets do. A local plant enable stocking, which is another facilitator of further growth in the region.

4.2.4. Business Model

4.2.4.1. Value Creation and Value Capture

AkzoNobel has a market leading global position in colloidal silica with a strong product differentiation. The company is able to consistently deliver a high quality product due to strong R&D and production and capabilities. As of today, the company has eight manufacturing plants, two of which are located in Asia. As previously mentioned, colloidal silica is now used in over 20 different applications. The technical applications are located at various stages of the value chain of the customers, and thus add a different value, depending on which stage in the value chain it is used. Being a large multinational enterprise entail large overhead costs. Therefore, the focus is mainly on the high end segments, where the product adds significant value to the customer. The global presence of AkzoNobel allows the company to transfer knowledge of successful cases and new application areas throughout the organization. Further, by showcasing expertise in supplying to a specific application in developed markets, sales personnel are able to leverage their previous experience and increase the confidence of customers in emerging markets. Customers in emerging markets often do not possess sufficient R&D capabilities, and are satisfied to see successful cases of use of the product.

"We have to put in quite a lot of effort in understanding their requirements because each customer has a different requirement and expectations vary from market to market or application to application. So there are varying expectations and then from application to application depending on the chemistry of their product and how our product can fit into that chemistry."

Colloidal silica is often a minor component of the customers' product but offer important features to the final formulation. Innovation is a key success factor to be able to continuously create value for customers and not fall into the trap of becoming a commodity business. Reinvesting part of the revenues in R&D is therefore critical to be able to maintain or increase profit margins of the business. Besides the product offering, AkzoNobel also sell various services around it, such as supply chain solutions and technical support. This sets them aside from the competition and allows them to integrate their solutions with the customer's' operations. Sales are made either directly or through distributors. The sales teams are responsible for conducting market analyses and identify new opportunities, i.e. finding new customers and distributors. Part of their daily operations is also dealing with established customers and distributors.

"Customers like the service. Especially if they are at the risk of having high volumes as a raw material and being dependent on a really good supply chain and reliable delivery of good quality."

The company is moving towards a global pricing strategy, although prices may differ to some degree depending on region specific cost conditions. A global pricing strategy is called for due to the consolidation trend of the chemical industry, as customers merge and acquire each other. In such a case, the lowest priced contract is often made effective, and leaves AkzoNobel with lower margins. Customers themselves are also expanding and become more global, which further drives the need for global contracting. Therefore, accounts in other regions has to be taken into account when negotiating with global customers. A big price gap may not be justifiable in some cases.

A customer who has to choose between purchasing from two competitors will, *ceteris paribus*, choose the organization he or she has a better relationship with. AkzoNobel treat relationships with great importance, emphasizing that it is important a customer always feels that they can rely on and take help from them. This commands a premium that the customer is willing to pay for – the prerequisite being of course that a quality product that offers an advantage to the customer is being produced. Maintaining good customer relationships, particularly with larger customers, yields AkzoNobel opportunities such as growing with the customer as they expand into new markets. Relationships in

Asia are particularly important. AkzoNobel's sales personnel work actively to spend time with customers, earning their trust and helping the brand gain visibility. As a generally price sensitive region establishing strong relationships is vital for customer retention – customers seldom break long term relationships over price if they are completely satisfied with quality and service. Maintaining relationships with customers in Asia can be challenging however, as organizations there frequently shuffle employees.

"For the whole chain – a good product, good support, trust – they [customers] pay a premium."

The brand is an important asset for a multinational firm expanding into new markets. The brand of AkzoNobel is associated with high quality. A European or international brand is seen as attractive in emerging markets, and can boost the confidence of customers in high end segments. Customers in lower end segments are more price sensitive, and are less interested in brands. It is seen as important not to underprice offerings, as there is a risk that the brand will become associated with poor quality manufacturers. AkzoNobel want to signal a consistent message in all their markets and put emphasis on sustainability in their branding strategy, which can open new opportunities.

"I think the reason that the Chinese choose international suppliers is because they trust our quality… It gives the customer confidence."

4.2.4.2. Business Model Dynamics

AkzoNobel has not modified the value proposition and value capture function of its business model when entering emerging markets. However, entering emerging markets have had implications on operations in developed markets. This is a consequence of different levels of competence present in the regions, where customers of emerging markets often have weak R&D capabilities and not a full understanding of their product. A consequence of the high growth rate of emerging markets is that customers have a different time horizon in terms of development and planning compared to customers in developed markets. Furthermore, as customers attempt to bring the performance and quality up to standards of developed markets, they try to copy technology of western markets without having a full understanding of the technology itself. A combination of these factors lead to a more dynamic marketplace and present challenges to the sales teams present in Asia.

"The expectations vary, some people would expect us to develop the entire product for them and test it and give it to them. Sometimes the expectations are too high, the moment you talk about colloidal silica, they think they have a readymade product that they can just adopt and start manufacturing with... So that's where we have to be careful in reminding the customer that see we are colloidal silica specialists, we manufacture colloidal silica, we don't do that research."

A consequence of the weak R&D capabilities of the customers is that they often have a need for more technical support. They are often not able to understand how colloidal silica can be integrated with their product and processes, and require example formulations including colloidal silica for their product. Expectations among customers in emerging markets can be high, in which case the company has to remind them that AkzoNobel is unable to conduct research for them.
This is something that customers in developed markets rarely asks for, as they themselves have sufficient R&D capabilities to understand how to make use of colloidal silica and integrate it with their product. However, it should be stated that R&D capabilities not only depend on region, but also customer segments. As an example, catalyst manufacturers in general have in-house R&D due to the innovation intensive industry, where catalyst customers often value performance over price.

As the sales offices in Asia were established just a few years ago, the sales teams are still inexperienced relative to the sales teams in the developed markets. This creates a discrepancy in the value capture mechanism of the company as the sales teams become more dependent on the in-house technical competencies that exist in the regions of developed markets. The implications of this have been that the technical specialists working within marketing and sales have become strained.

Expansion into emerging markets have put more pressure on the central organization. To enable international expansion in emerging markets, resources used for developed markets have been freed in order to offer sufficient support to customers in such markets. This issue has been somewhat mitigated by putting more emphasis on cross-communication between regions, sales teams and technical specialists. AkzoNobel is thus able to better leverage its global presence when expanding into new markets. Furthermore, a technical specialist has been hired to one of the emerging market sales offices to support local operations.

"We don't have the same competencies everywhere, but the same model… It requires more attention because there is a greater need for support from both customers and personnel [in Asia], as they are less experienced."

The global presence of the company is further leveraged by its ability to analyze sales data from developed markets to identify opportunities for knowledge transfer. When new applications emerge or an established one grow in sales, information is spread throughout the organization. Sales teams in other regions are thus able to evaluate the potential of that application in their market. However, it is rare that the application can be copied directly, due to local processes and market conditions. Customers in emerging markets are operating under different legislative and market constraints. Even for customers with a global presence, it is not certain that they use the same processes or formulation in the markets that they are present in. However, previous experience and knowledge transfer are still important factors that can be leveraged in the sales process as it helps AkzoNobel to engage with its customers. Successful cases of how customers in developed markets e.g. save process time or production costs can be used as a reference.

"There is always a difference, you cannot transfer one thing one-to-one to another country, it needs adaptations, and for adaptations discussions are necessary."

AkzoNobel faces different competitive challenges in different regions. The nature of competition and their relative aggressiveness can differ significantly. To better understand and deal with this, BI focus rather extensively on competition – more so than they do on customers – collecting information to identify where they are active and potential focus areas for AkzoNobel. As a centralized team that operate from the organization's office in Bohus, BI have stressed the importance of taking help of someone local when analyzing competitors in emerging markets – typically the local sales personnel present there. With many new competitors emerging in these markets and their propensity to remain privately held, there is little to no information disclosure, making monitoring of their activity challenging. As a consequence of this competition in South East Asia is not obvious yet to AkzoNobel. In contrast the organization has been better able to map competitor activity in China, identifying numerous local competitors across each application area. At present opportunity therefore lies in the high quality segment.

Quality is of great importance to AkzoNobel. It is central to the value proposition of its offerings and an aspect that the organization wants customers to associate its brand with. Maintaining high quality standards is not an issue when AkzoNobel exports to markets from established production facilities in developed markets. Establishing production in emerging markets however has proven to be more challenging as AkzoNobel has experienced at their site in China – it takes time for sites to gain the experience needed to produce at the quality standards set by the organization. With high quality comes the high cost trade-off. Generally emerging markets are price sensitive. The organization, with operations in China as an example, stresses the importance of being able to drive down the cost of production to ensure that in the long term it can remain competitive against steadily developing local producers. It is clear to the organization however that cost-advantages are not its selling point and it also highlights the risk of brand dilution and being associated with low-quality should it decide to compete on price.

"If we talk about price only, obviously on a short term the customer would appreciate that whereas over a longer period they would start matching us with substandard manufacturers who don't have any consistency or things like that. We don't want to underprice our product and sell to them."

Lead times pose a significant challenge to the organization when exporting to emerging markets. Customers in these markets, which are inherently dynamic, are described to seldom plan their orders or forecast expected demand, instead placing orders rather sporadically in line with how their outlook changes. There is a minimum lead time of three months for an order placed in China with production in Europe – a mismatch with the dynamic nature of the Chinese market. In a bid to address this AkzoNobel has gradually increased their commitment to the market, by maintaining stock in the country and more recently establishing a local production site. Long lead times remain an issue in other emerging markets of interest such as India and ASEAN where no local production sites exist.

AkzoNobel maintains both direct sales to customers and a network of distributors across their operations in markets around the world. In the past the organization has sought distributors only in markets where a local sales team was not present but this has proven to be successful to a certain extent. Distributors act as an extended arm to the organization, multiplying their customer base amongst smaller buyers. This allows the organization to maintain a relatively lean in-house sales organization that can focus to a greater extent on serving larger customers. The approach has proven to be successful in developed markets – in Europe the business unit has been to able to multiply its customer base by a factor of 2.5 through its distributor network.

"Distributors have their own portfolio and to add a new specialized product to their portfolio doesn't mean they can sell it everywhere. So they sell it maybe with their products in some applications. That is also the experience we have had with distributors, that the growth you can reach with distributors is limited."

The organization acknowledges that the growth one can achieve in a market through distributors is limited. It requires a certain skillset and familiarity with AkzoNobel's offerings to be able to convincingly sell to customers, particularly in emerging markets where customers expect a greater degree of technical support. AkzoNobel maintains that there is room for improvement in this regard on their part and they therefore work actively with distributors, maintaining regular contact to provide education, assist with support when talking to customers and technical guidance. Additionally, an annual distributor meeting is held, where distributors are invited to learn about and update themselves on technical developments and potential changes in the offerings.

5. Discussion

In this chapter, AkzoNobel's expansion into emerging markets in Asia is analyzed through the lens of the theoretical framework developed. Two examples of business model adaptation are also presented to provide insight from previous cases.

Given the asset intensity of the chemical industry, MNEs are put in a position where they need to carefully prioritize their capital allocation to the highest growth opportunities. At the same time, MNEs operating on a global scale face the challenge of heterogeneous markets, technologies and legal structures. Mature products in one region may be innovative products in another. There may be a need to adapt the business model and explore new packaging or delivery methods to address these challenges. Customer intimacy guides this process, identifying the levers of innovation that need to be employed in terms of product, solution, technology and business model innovation. The emergence of business model innovation is a testament that a combination of approaches is required to establish a sustainable competitive advantage in the marketplace.

5.1. Assessing Growth Opportunities

For large businesses, market analyses is often an ongoing process, which is reflected in the case of AkzoNobel. The analyses take place at various functions of the company. As various parts of a market analysis serve as input to various functions of a firm, such as strategic planning, portfolio management and product development, this structure appears efficient. The sales teams are responsible for customers, and actively scan the market for new customers to approach, while simultaneously handling established customers. Given that there are more than 20 different applications for colloidal silica, this put a lot of pressure on the sales teams. The business intelligence function focus actively on networking with other parts of the business unit to gather as much bits and pieces of information to attain a complete picture of the markets that AkzoNobel is involved in. This information is then packaged and presented to management, to support them in making decisions.

By conducting quarterly interviews with sales managers, the challenge of tacit knowledge can be overcome as reports and other data are unable to capture the full picture of the markets (Grant, 2010). The greater part of organizational learning is experience based and managing knowledge transfer between different functions is critical to be able to utilize that knowledge more efficiently. This is especially important in the case of emerging markets; as publically available information is limited. Emerging markets firms are not governed by the same transparency regulations that firms in developed markets are subject to. Thus, factors such as profitability and strengths of competitors are hard to assess directly. Relying strictly on public information limits the accuracy of market analyses for emerging markets and the ability of making reliable forecasts.

In Figure 7, the value capture function of a company is divided into three steps: (a) identifying market segments to be targeted, (b) confirming available revenue streams and (c) designing mechanisms to capture value. AkzoNobel leverages its global presence by targeting application segments in emerging markets of which they have gained experienced in in developed markets. An issue with this approach is that the segments may not be the same as in developed markets, as customers in emerging markets are operating under different legislative and market constraints. As mentioned, the company may enter a new market for a number of different reasons. When entering a new market and targeting new customers, the company approach distribution centers, which is in line with what Rugman & Colinson (2009) suggests. By using distributors, AkzoNobel is able to learn more about the market, in terms of what type of segments are present in the given market and how big the market is, thus confirming available revenue streams. Thus, AkzoNobel is able to mitigate the risks involved to an absorbable degree when entering a new market. If the market proves sizeable enough, AkzoNobel may proceed to set up their own sales office. The relationships with the distributors are of major importance to the company, as they function as a link to the customers to whom the company does not sell directly. AkzoNobel gets access to market and customer information through the distributors, which can prove critical at the moment the company decide to increase the depth of involvement in a given market.

The process of assessing opportunities for growth in an established firm is a very dynamic process, which is conducted over time. However, the factors presented in the framework for analyzing growth opportunities (Fig. 5) remain the same and are taken into consideration when assessing markets. To better capture the dynamism of assessing growth opportunities, a longitudinal case study would have been preferred, as to further study how the firm assess and evaluate growth opportunities over time.

5.2. Business Model Compatibility

Business models maintain dynamism to take into account the uncertainty of the constantly changing external environment. Translated to the context of a firm established in developed markets and the compatibility of its business model with an emerging market that it seeks to expand to, there are numerous uncertainties and challenges present in this new external environment. Addressing this requires a process of business model adaptation, and doing so from a value-based perspective ensures that all stakeholders involved are satisfied in the long term.

AkzoNobel has, over time, built a strong image for themselves in Europe and the US as a trusted partner that offers high quality, timely, reliable supply and extensive support – their value proposition. Customers in these markets have shown a propensity to value and appreciate these aspects, allowing AkzoNobel to command a pricing premium. The value proposition is central to the business model and therefore shapes the nature of value creation and value capture. AkzoNobel's resources and capabilities have therefore evolved over time to best serve this value proposition.

With expansion to emerging markets in Asia, AkzoNobel has fundamentally stayed true to their value proposition, allowing them to lever the strengths and expertise of their organization. The danger with this however is that the external environment is significantly different to that of the mature markets where the value proposition has proven to be successful. Applying this value proposition to a new context rests on an important assumption – customers in these regions being at least equally accepting of a premium, high quality, high service partnership. Customers in emerging markets are operating under different legislative and market constraints and may therefore be more price sensitive. Furthermore, the ownership structure can also differ and affect companies to act differently. As noted in the case of China, state owned enterprises are more interested in resource monetization and economic development and not primarily on maximizing shareholder value. Consequently, AkzoNobel may have to put in more work into advertise the benefits of using its products, weather it may lead to an improvement of yield, energy efficiency or runtime. Without adjusting the value proposition there is a certain degree of rigidity in the business model, reducing the degrees of freedom as to how value creation and value capture can be adapted to the new context.

Customer clarity is therefore key. A firm understanding for customers in the emerging market of interest, their priorities and preferences, will help verify the assumption that the same value proposition holds true to the new context. For AkzoNobel this has proven to be a challenge. There is an acknowledged want within the organization to dedicate more resources to customer development in emerging markets, a responsibility that falls now on the rather small sales teams based in those regions. As a consequence of this AkzoNobel chooses to adopt a more tangible, trial-by-error approach where the value proposition is assumed at the offset to hold in the new context allowing the organization to utilize established resources and capabilities, and make adjustments primarily on the value capture front.

In line with Rugman and Colinson's (2009) observations, the organization initiates operations in a new market with low depth of involvement – by approaching distributors – thereby minimizing downside if there is a mismatch between their value proposition and customer preferences. If not the depth of involvement increases, through establishment of a local sales team to establish and develop customer relations, and ultimately a local production site. The challenge with this however for the organization is the availability of suitable, technically qualified distributors in emerging markets who are keen to understand and grow the business. A lack of such readily available distributors, means that AkzoNobel

needs to a certain extent create the system ground up in certain emerging markets, providing rather extensive technical education and support so as to ensure that these distributors can convincingly persuade customers to take interest in the organization's premium offerings. This implies that even at a seemingly low depth of involvement in the emerging market AkzoNobel must commit a greater degree of resources to the emerging market – necessary to initiate operations in the new context.

Business models are shaped by the external environment of the context they are applied to. Those originally designed for developed markets are therefore incompatible with emerging markets, unless adaptations are made. Differences in the institutional environment, the general lack of suitable value creation partners and alternative customer segment compositions must be factored in and adjusted for to apply the business model to the context of the emerging market. Landau et al. (2016) state that firms initially extend their developed business model into emerging markets and the process of adaptation varies over time. Confirming this observation, AkzoNobel has not adjusted its business model to the local context when entering emerging markets. Know-how is of central importance to the value proposition of the organization, characterized by high quality and high service partnership. This business model, common to manufacturing industries, where producers differentiate themselves through application know-how is dependent on highly skilled and experienced workers. As the sales offices in Asia were established just a few years ago, the sales teams are still inexperienced relative to their peers in developed markets. Expansion into emerging markets has put more pressure on the central organization.

Thus, the context of emerging markets has to some extent challenged the logic of the business model of the company. To enable international expansion in emerging markets, resources used for developed markets have been freed in order to offer sufficient support to customers in such markets. This issue has been somewhat mitigated by putting more emphasis on cross-communication between regions, sales teams and technical specialists. AkzoNobel is also looking to hire more technical experts to its sales teams in Asia.

5.3. Examples of Business Model Innovation

To illustrate the challenges of dealing with internationalization and heterogeneous market conditions, two examples are presented in this section. These are examples of how two large MNEs have innovated their business models in response to a new context. The cases are deemed relevant with respect to what AkzoNobel is experiencing, and can provide insight as to what lies ahead.

5.3.1. AutoLux

Premium German automobile manufacturer AutoLux's internationalization to the Indian market serves as interesting example to contrast how a well-established player in mature markets adapts its business model to cater to emerging markets. Its adaptation to the new context took place in four phases – international extension, local emergence, local expansion and local consolidation – emphasizing adjustments to different components of its business model with increasing depth of involvement in the market (Landau et al., 2016).

In the mid 1990s AutoLux began exporting cars to the Indian market, targeting a small segment of wealthy individuals through a two local mediating partners, effectively acting as distributors. Doing so allowed the organization to gain insight into the market and served as a basis for evaluating if there was potential for greater involvement in the market. Almost a decade later AutoLux initialized operations in the market more formally, setting up a subsidiary sales organization and establishing a local production site. The decision was driven by a marked increase in demand for their offerings in the market, the unfavorable tariff structure for imports in the country and competitor activity. 2010 saw expansion in their operations with increased production capacity and growth in their dealership network to branch into smaller urban centers in the country, widening their customer base. AutoLux further increased its commitment to the market during this period through the launch of financing and insurance subsidiaries. From 2012 onwards the organization has focused on consolidating its

operations, focusing on improving its array of services and products to customers, while also introducing new subsidiary brands from its international portfolio of vehicles.

For AutoLux adopting its traditional, designed for developed markets, business model to the context of the Indian market would prove itself to be ineffective as a result of its characteristics – the different breakdown of customer segments, a lack of transaction partners and different legislative framework (Landau et al., 2016). AutoLux therefore, through multiple phases over increasing depth of involvement, developed a local business model to suit the characteristics and overcome the challenges of the new context. Figure 13 provides an overview of how emphasis was laid on different components of the business model through AutoLux's four phases of adaptation.

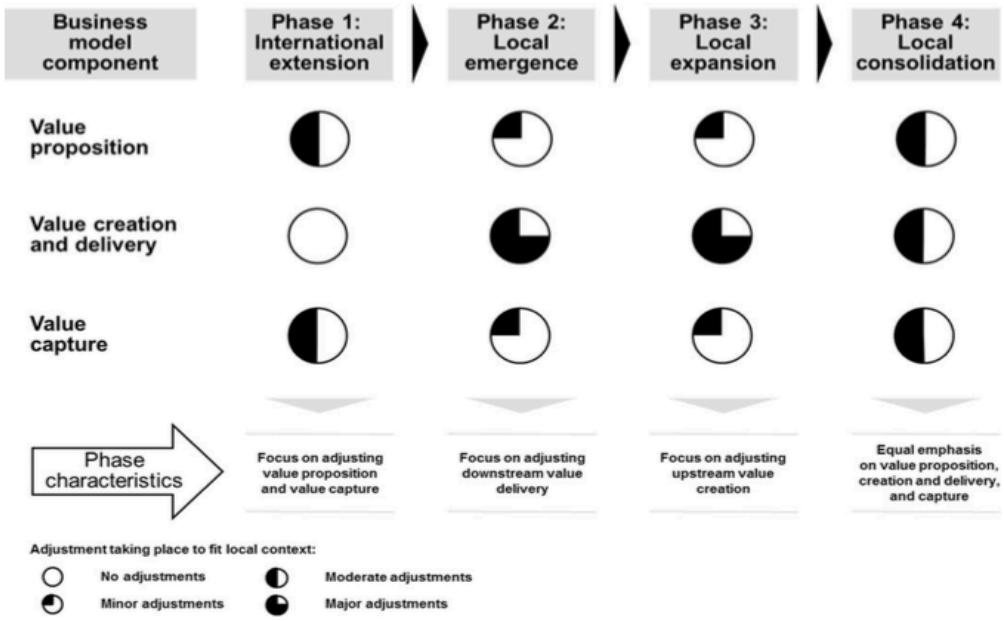

Figure 1. Internationalization process: business model adaptation perspective.

Figure 13: Business model adaptation process at AutoLux in the Indian market (Landau et al., 2016).

In the International Expansion phase AutoLux essentially extended its existing business model to the new context, relying on its already established value creation and delivery mechanisms. Adaptations made related to the nature of customer segments in the market, adjusting the value proposition and value capture mechanisms to better understand and meet customer preferences. Focus subsequently shifted in the Local Emergence and Local Expansion phases to making major adaptations to the value creation and delivery components of the business model, with emphasis on downstream value chain activities initially. To do this AutoLux established a local production site, but opted to simply assemble imported complete knock down (CKD) kits. Doing so bought AutoLux time with respect to finding suitable local upstream partners that met their requirements. Further the establishment of local sales, financing and insurance subsidiaries helped adapt value delivery mechanisms to the new context. After making adaptations to the various components in this stage-by-stage manner, the final Local Consolidation phase sees moderate adjustments across all components in a more cohesive manner to best optimize the model to the Indian market.

The AutoLux case shares certain fundamental similarities to the expansion of AkzoNobel's colloidal silica business to emerging markets. Both well established players in developed markets whose offerings cater to a premium segment, initiated operations in emerging markets through the use of local mediating partners. With time, as market interest was confirmed, local sales organizations were established. For both the existing business model, designed for developed markets, was extended to the new context, making use of established value creation and delivery mechanisms. Differences arise however in that Autolux during this period also made adaptations to their value proposition, factoring

in the differences in customer segment breakdowns in their market of interest to meet local customer preferences. This stands in contrast to AkzoNobel's approach where the value proposition for developed markets has been maintained in the new context. For AutoLux adapting the value proposition at an early, low depth of involvement stage, allowed it to gain a more comprehensive confirmation of market interest and characteristics. This served as a basis to decide if it should proceed with the significant investments needed to adapt value creation and delivery mechanisms to the new context associated with a greater depth of involvement in the market. For AkzoNobel, pursuing a similar approach where more emphasis is laid on market specific customer preferences and characteristics may be of interest to better adapt to these contexts.

5.3.2. Dow Corning

Another example comes from the chemical industry, in which Dow Corning innovated a new business model around one of their existing silicone products. In the early 2000s, Dow Corning experienced many of the product maturing, and losing its differentiation compared to its competitors. Further, the service intensive character of the performance chemical industry was found less attractive to major parts of the customer base. These customers were more price sensitive, and demanded an undifferentiated product along with reliable supply to competitive prices. Based on this, Dow Corning decided to innovate a new business model, separating its product offering into two brands; Dow Corning and its new brand Xiameter.

"Dow Corning took a bold gamble when it launched Xiameter, a new business model comprising an online-managed, low-cost, no-frills sales channel for its commodity silicones, offering competitive pricing to customers willing to buy in bulk, without research or technical support." (Frei & Musso, 2011)

The business model was clearly defined and applied to Dow's undifferentiated business with the objective of achieving efficiency and quality of supply to a competitive price. As the value proposition was directed to low innovation intensive customers, the company did not have to spend cash on research, except toward process improvements. Gregg Zank, chief technology officer and executive director for specialties and technology, states that it is the customer's perception of the product that determines that a product is no longer differentiated (Frei & Musso, 2011). Signals of an undifferentiated product can be weak IP protection, that similar products are offered by competitors or that sales personnel meet with procurement instead of business developers.

The Xiameter business model allows Dow to fully utilize their assets and provides a beneficial synergy to their specialty chemical plants (Frei & Musso, 2011). Furthermore, the new business model has allowed the salespeople in the specialty chemical business to focus more on working with customers in areas of growth and new business development rather than selling existing products to existing customers. Thus focusing resources towards establishing differentiation in areas of growth and focus more on process efficiency in businesses where they have seen their products mature.

The case of Dow Corning exemplifies how a firm can structure its organization to free resources to high growth areas, while maintaining current customers that are not in these areas. A major insight from this case is that it is not the focal firm that determines whether a product is differentiated or not. This logic can be transferred to different application segments and markets. A product can be perceived as innovative in one region, and mature in another. By allowing a low cost, no frill alternative through an alternative business model, a firm can streamline sales to mature application areas, while focusing its resources to develop new customers in high growth areas. Although, AkzoNobel is experiencing significant growth for their colloidal silica product line, it may experience some application areas maturing. To allow further growth while simultaneously keeping a lean organization to control costs, the option of developing an alternative business model for mature application areas can be explored.

6. Conclusions

This thesis provides a market analysis which presents in depth information on size, growth and industry structure of the catalyst market in emerging market regions. This can serve as input for decision making at AkzoNobel, given that an increased depth of involvement in these regions is being considered to meet future growth targets for the colloidal silica business. Further, challenges with emerging markets and business model compatibility were addressed to provide insight on the risks of transferring a business model designed for developed markets to emerging markets and opportunities for possible adaptations of the business model. The findings, as well as the theoretical framework developed, are in principle not specific to AkzoNobel and are therefore deemed generalizable to other businesses engaged in internationalization to emerging markets.

Based on the findings of this thesis, firms assess growth opportunities over time, making low commitments to the market initially to mitigate risk. By using local distributors, firms are able to gain insight of the market and customers within the region. This enables firms to confirm available revenue streams and appreciate the market size, to thereby increase their depth of involvement in the market given suitable potential. The potential remains a function of the country specific factors and industry specific factors, which were recognized in the theory section.
Firms enter emerging markets by extending their current business model designed for developed markets. Since firms enter new markets with a low depth of involvement, the value proposition and value capture mechanisms of a business model are the first components to be challenged by the new external environment. The core value proposition remains the same between markets – as the firm's value proposition is able to generate competitive advantage in developed markets, it is assumed by the firm that it is likely to succeed in emerging markets as well. However, the value capture and delivery components of the business model are not strictly compatible in the new context of emerging markets and may require adaptation.

To help illustrate opportunities for possible adaptations to the business model two real-world examples were drawn upon – AutoLux's expansion to the Indian market and Dow Corning's business model innovation venture, Xiameter. AutoLux, by initially focusing on adaptations to its value proposition, addressed one of the key challenges with emerging markets – different customer segment compositions. Doing so at a stage with low depth of involvement in the market enabled it to gain the insight needed to decide if subsequent, investment-intensive value creation and delivery adaptations should be pursued. Dow Corning was able to streamline sales to mature application areas, while focusing its resources to develop new customers in high growth areas by innovating a new low cost, no frill alternative business model around their silicone business.

There has been a call for more research on business model transformation in specific contexts (Aspara et al., 2011). This thesis provides insight on the processes of assessing growth opportunities and of business model compatibility in the context of an MNE expanding to emerging markets – the latter being an area that has not been widely studied. Studies have been researching the performance of business models in different industry conditions. In contrast, this thesis explores the performance of business models designed for developed markets when exposed to new international contexts, specifically emerging markets. By doing so, this thesis furthers the discussion on business model internationalization.

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