Natural Imprinting and Vertical Integration in the Extractive Industries
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Abstract
Two traditional lenses applied to explain vertical integration decisions firms make are Transaction Cost Economics and Resource-Based View. However, they face limitations considering the persistence of such decisions over time, particularly in the extractive industries. Drawing on imprinting theory, this chapter provides a theoretical link between the initial natural resource characteristics surrounding a firm’s birth and its choice of vertical integration. The main argument is that initial natural resource conditions have an imprinting effect on the vertical integration decisions made by firms in the extractive industries. An imprinting process through which imprinting happens is explained. This mechanism acts as the carrier of initial influences as how firms lock-in a decision for their supply chain management. We discuss the above mechanism and several propositions concerning the kind of influence different initial natural resource characteristics have on firm decisions. Our main contribution is presenting a natural imprinting view that can explain the enduring effect of natural environment characteristics on firms’ ownership structures in the extractive industries.

Introduction
New firms are faced with the inevitable strategic choice of configuring their value chain activities, which includes a variety of activities from acquisition of raw materials in the upstream to distribution of the end product in the downstream (Porter, 1985). New firm’s decisions regarding vertical integration choices are strategically important since they can affect their competitive advantages in the future (Qian et al., 2012), evolution of organizational capabilities over time (Helfat and Peteraf, 2003), and their capability to compete against the uncertainty of supply and demand in the markets (Arrow, 1975). This maybe in particular important in the natural resources industry, which has little opportunities to for example differentiate its products, making costs and structural choices one of the few avenues left to gain competitive advantage.
Transaction costs economics (TCE) dominated the prior literature on determinants of vertical integration decisions for decades by arguing that firms vertically integrate to the activities that are subject to opportunism (Williamson, 1975, Williamson, 1985). However, there have been critiques to the overemphasis on the TCE based claims by a number of researchers (cf. Demsetz (1988); Argyres and Zenger (2012)) . While TCE has been strongly supported by empirical research, it has little regards for firm-level heterogeneity in terms of resources and capabilities that can potentially influence firms’ boundary decisions (Argyres and Zenger, 2012, Leiblein and Miller, 2003). The limitation of this assumption (i.e., homogeneity in assets and resources) is that “... all firms given a set of transactional attributes will reach similar conclusions regarding which activities to execute internally and which activities to outsource.” (Leiblein and Miller, 2003, p.841). By relaxing the homogeneity of assets and capabilities assumption, the alternative view suggested by many researchers is the Resource-Based View (RBV) that argues firms choose to vertically integrate to activities where they have comparative advantage (through for example skill sets or specialized experience or expertise) and outsource activities where they lack capabilities that give them an edge over competitors (Demsetz, 1988, Argyres, 1996, Barney, 1999).

However, RBV cannot acknowledge the impact of initial historical decisions that led to development of those capabilities in the first place (Argyres and Zenger, 2012). To address this a synthesized view of TCE and RBV is proposed by Argyres and Zenger (2012), where they argue that firms internalize activities that require resources which are uniquely complimentary to their current capability and resource profile. But what if the resource is the product? In the extractive industries firms explore new natural resource deposits with the aim to extract and sell them. A key organisational response in situations of relative
resource scarcity is to engage in vertical integration to gain control over resource deposits (Carney and Gedajlovic, 1991, Combs and Ketchen, 1999). Yet, levels of vertical integration are quite different across types of natural resources and even subject to disintegration trends despite increasing levels of resource scarcity (Hennart, 1988). For example, a dominant mode of organising in the oil industry is vertical, which is far less common in metal mining, in spite of both industries having the extractive nature in common. Recently, vertical integration patterns in the oil industry have been subject to disintegration whereas in the metal mining companies seem to opt for a more vertical integration strategy. This suggests a need for additional explanation of the impact of natural resource characteristics on organizational responses in the extractive industries.

Only recently have researchers started to focus on founding period (cf. Argyres and Mostafa (2015); Qian et al. (2012)). Barney (1991) also acknowledges the role of unique historical events as determinants of firm’s subsequent strategies. Attention to the founding period is important, since “Decisions made at entry are likely to create differences in competitive advantages not just then but also over time.” (Qian et al., 2012, p.1330). Such studies have largely focused on the role of prior knowledge and experience in firm’s governance choices at founding (Argyres and Mostafa, 2015). Although there are a few attempts that consider initial resource conditions (such as scarcity and complexity) as drivers of vertical integration decisions (e.g. Mick et al. (1993) and Carney and Gedajlovic (1991)), natural resource characteristics have not been extensively taken into account in this literature. Yet, firms in the extractive industries rely heavily on natural resources and these resources are also their end products. Thus, one interesting question is: how do characteristics of natural resources influence the managerial decisions regarding vertical integration structuring?
To address the above question, we draw on imprinting theory, which in its core it tries to explain, how prominent environmental features such as initial resource conditions are embodied in organizational choices during a brief sensitive period such as founding, and how these choices persist long after the sensitive period and when environmental conditions have changed (Marquis and Tilcsik, 2013). As such, imprinting is uniquely equipped as a theory to address our research question. In doing so, we identify and discuss “management mindset” as the imprinting mechanism through which natural resource characteristics influence vertical integration decisions. Since our focus is on the firms in the extractive industries, characteristics of the natural resources that will be evaluated in this chapter are availability, accessibility, commoditization, dispersedness and capital intensity during the establishment and first few years of firms in extractive industries.

This paper thus aims to shine light on decision making process that leads the new firms’ managers to choose a specific strategy and will help explain how initial motivations in combination with surrounding environment affect strategic decisions in a way that they persist lengthily. We will discuss the mechanism through which the initial characteristics of the natural environment influence the long term structural development and behaviour of organizations. We will also contribute to the imprinting theory by adding a natural imprinting perspective by considering natural resource characteristics. No study has to the best of our knowledge, considered natural resource characteristics as a source of imprinting on the firm strategic decisions.

The first section of this chapter discusses the vertical integration decisions and initial environmental conditions. The natural imprinting view of the firms is then developed by explaining the proposed imprinting mechanism and process. Next, propositions are made to
explain the vertical integration in extractive industries through natural imprinting lens. We will conclude the chapter by suggestions for future research.

**Vertical integration**

At time of founding, firms need to make strategic decisions that can deal with their present and future competitive environment (Argyres et al., 2015). One of the important decisions that could provide firms with future competitive advantage is configuration of their supply chain (Argyres and Mostafa, 2015). The literature on vertical integration has discussed the choice of boundary decisions from a diverse range of perspectives, which can be divided into two categories: economic costs and capabilities view.

There are two major theories regarding the economic costs explanations: economics of scale (Stigler, 1951), and transaction costs economics (Williamson, 1979, Williamson, 1985). Stigler (1951) proposes a life cycle theory of vertical integration based on market size and associated division of labour over the time periods. He suggests new industries start off as vertically integrated, which is then dominated by vertical disintegration patterns as soon as the market grows and economics of scale are justifiable. This trend is subsequently followed by reintegration patterns as the industry begins to decline. Although certain industries are compatible with his model, there are industries that do not follow these patterns, such as automobile industry that was quite differentiated in its early stages (Langlois and Robertson, 1989). The emphasis of Stigler’s model is on the production and manufacturing costs, which cannot provide enough evidence on why firms decide to stay vertically integrated while they can independently or conjointly make profits by pressuring the downstream (Langlois, 1988). Suggested by Coase (1937, p.390, 391) for the first time, “cost of using price mechanism”, “costs of negotiating” and “concluding a separate contract for each exchange
transaction” are brought into the picture to explain the extent of firm boundaries. Williamson (1985) shows that vertical integration firm structures minimize both the transaction and production costs. High uncertainty associated with necessary coordination and negotiations between buyers and suppliers due to underdevelopment of manufacturing designs in early stages of an industry can raise transaction costs (Williamson, 1975, Williamson, 1971). There are also asset specificity considerations that can increase the negotiation costs and therefore give rise to more vertically integrated structures (Williamson, 1985, Klein et al., 1978). However, the ignorance of TCE to the heterogeneity of resources and capabilities, limits its explanatory power of persistent financial advantages (Argyres and Zenger, 2012). Specifically, TCE faces challenges to explain how vertical integration decisions can lead to sustained advantage for firms over time.

The second trend in the vertical integration literature is towards theories with perspectives on resources and capabilities. Prior research acknowledges the role of organizational resources and capabilities in evolution of vertical firm structures (Helfat and Campo-Rembado, 2016). Based on this view, firms tend to internally govern activities of supply chain when they possess comparative capabilities, and outsource the ones when they lack required competencies (Barney, 1999, Kogut and Zander, 1992). However, “…, causality in the relationship between capability and boundary choice may be precisely the reverse of the common articulation” (Argyres and Zenger, 2012, p.1644), which suggests ignoring historical explanations for developing capabilities that facilitate the vertical integration decisions in the first place. This contradicts with the RBV assumptions that acknowledges the “…unique historical events as determinants of subsequent actions” (Barney, 1999, p.108). Thus, recent interest of the literature in vertical integration is towards synthesized theories that consider the historical explanations, particularly time of founding. For
instance, Argyres and Mostafa (2015) discuss the process of knowledge inheritance from parent firms to spin-offs and how this early source of capabilities can help new firms decide on their boundary strategies. And Qian et al. (2012) examine firm’s boundary choices at their entry time drawing on organizational economics, organizational capabilities and industry evolution. The former article focuses on the human capital resources and the latter also considers organizational capital as sources of organizational capabilities at time of founding. Some of physical dimensions of environment in a general sense, such as scarcity and complexity, have also been considered as determinants of vertical integration choices by prior literature (e.g. Mick et al. (1993) and Carney and Gedajlovic (1991)). However, often a taken-for-granted source of capabilities considering vertical integration decisions are natural resources. Hart (1995) suggests firm’s relationship to natural environment can affect its strategic decision making and, thus, providing it with a competitive advantage. Particularly, firms in the extractive sector face the inevitable choice of dealing with the characteristics of natural resources since their supply chain begins with the acquisition of natural resources and these natural resources are further their end product. Accordingly, our interest is in understanding what aspects of the natural resources can affect the vertical integration decisions of firms at time of founding and how these characteristics have an enduring effect. Thus, we need to first understand the framework that offers to explain the process that forms these initial lasting impacts.

**Imprinting**

There has been an ongoing and growing debate about the role history plays in the management and organization research (Kipping and Üsdiken, 2014). Started by the seminal work of Stinchcombe (1965), *imprinting* is becoming one of the dominant explanations of
persistence of early conditions (Marquis and Tilcsik, 2013). Stinchcombe’s (1965) insights made two main propositions as the foundations of imprinting theory. First, the impact of founding conditions is reflected on the organization structure. Stinchcombe’s (1965) emphasis is on the “social history” and “economic conditions” and how these forces surrounding firms at birth are imprinted on the firm structure. The second point made by Stinchcombe, is the “stability of those structural characteristics”, which links contemporary manifestations of organizational forms to initial environmental conditions and constraints at their formation. He mentions “traditionalizing forces, the vesting of interests and the working out of ideologies” as the persistence functions that maintain the initial frameworks through time. The initial outlines suggested by Stinchcombe are expanded by several successors of imprinting theory. Prior research emphasize on the founding conditions by considering the imprinting effect of economic constraints (Kriaucünas and Kale, 2006), cultural entrepreneurship (Johnson, 2007), institutional settings (Oertel and Söll, 2016), external organizations (Perkmann and Spicer, 2014), alliance networks (Milanov and Fernhaber, 2009), parent organizations (Ferriani et al., 2012, Agarwal et al., 2004) and prior affiliations of founding team (Beckman, 2006). One of the ignored areas is the natural environmental sources of imprints. Particularly in the extractive industries where there is an undeniable dependence on the natural resources and natural environment. George et al. (2015, p.1595) discuss that: “However, while scholarly research on business and the environment has been growing (Berchicci and King, 2007), our understanding of the management and the organization of natural resources remains limited, especially regarding its industrial ecosystem of use and trade and its implications for individual behaviour, organizational performance, and quality of life.” Therefore, for employing imprinting lens for developing arguments in regard to organizational decision making, we need an
integrated framework that is able to engage managerial tools into the challenges of the natural resources (George et al., 2015).

There has not been a strong integrated framework presented to cover the prior research on imprinting before the two systematic reviews were published by Marquis and Tilcsik (2013) and Simsek et al. (2015). Most scholars take the imprints as “given”, and try to explain the phenomenon of enduring past influences (Kipping and Üsdiken, 2014). Their propositions on how imprinting process works are highly dependent on the sources of imprinting they identify and how the features of these sources are mapped onto the organizational structures and behaviours. And it is through this lens that attempts to explain how imprinting occurs are different. As a result, driven by the outcomes, they depend on their preferred level and source of imprinting, taking alternative views into their investigations for granted. Therefore, the two review papers by Marquis and Tilcsik (2013) and Simsek et al. (2015), have an important effect on unifying the fragmented research ground after Stinchcombe (1965) and bringing new insights into the field. Marquis and Tilcsik (2013, p.199) define imprinting as: “... a process whereby, during a brief period of susceptibility, a focal entity develops characteristics that reflect prominent features of the environment, and these characteristics continue to persist despite significant environmental changes in subsequent periods”. Prior literature seems to agree on the core concept of imprinting in considering the three main building blocks outlined by Marquis and Tilcsik (2013), namely (a) sensitive periods, (b) manifestation of prominent environmental features, and (c) persistence of traits. In a similar way, Simsek et al. (2015) presents a multiprocess theoretical framework for imprinting research that consists of 3 main processes that are: genesis (the process leading to formation of an imprint), metamorphosis (evolution of an imprint) and manifestation (manifestation of imprint in firm outcomes). The perspectives
presented by previous imprinting research seem to be similar in accepting the founding conditions and to some extent similar subsequent sensitive periods such as transitions originated from shocks and crisis. However, as highlighted by Simsek et al. (2015, p.298): “...insufficient attention has been paid to the actual processes by which imprints form”. The emphasis on imprinting as a process rather than a once-off influence is the salient focus of Simsek et al. (2015) framework that helps develop more focused arguments for building work on imprinting. For the purpose of this chapter, we will employ Simsek et al. (2015) framework which is elaborated in the next section.

**Imprinting Process, Sensitive periods, imprinters, and imprinted**

Simsek et al. (2015) considers a couple of construct for clarification of the his three-phase imprinting model; namely, imprinter, imprinted, sensitive periods and imprinting process, that are discussed in accordance with our proposed natural imprinting model as presented in Table 1.

**Imprinter-** While imprinting researchers have investigated a diverse range of imprinters, our study focuses on the initial natural environment characteristics at time of founding. Although extensively studied as a source of imprints since the emergence of imprinting theory (e.g. Stinchcombe (1965)), there are still some aspects of the environment that need further investigation. Natural resource are the corner stone for most industrial activities. Most industrial sectors are directly or with some intermediaries dependent on the use of natural resources. So, a lot of issues associated with natural resources generally, and extractive industries in particular, affect a wide range of economic activities. Depletion and non-renewability of natural resources has urged the need for more understanding of the management of natural resources and their reciprocal relationship with organizations,
industries and nations (George et al., 2015). While our focus is on the extractive industries, we aim to provide a better understanding of the enduring impact of natural resource (i.e., minerals and, oil and gas) characteristics on the firms’ strategic behaviour specifically at time of founding. We chose five characteristics to be influential of the vertical integration decisions of firms: availability, accessibility, commoditization, dispersedness and capital intensity.

The impact of natural resource availability has been studied extensively by management and economic researchers. Prior research considers the natural resource scarcity to be both a threat and an advantage for firms (Bell et al., 2013). Researchers consider the availability of raw material to be crucial for firm performance and survival (Schoolderman and Mathlener, 2011). In addition to the natural barriers that limit the availability of natural resources, political disputes have also risen as a factor in firm’s access to raw materials (George et al., 2015) that affects their supply chain (cf. Coffman et al. (2011); Schoolderman and Mathlener (2011)). There is still a need for further insights into availability and supply chain configuration decisions. Natural accessibility has also been considered as a factor that affects the vertical integration decisions since it is associated with the technical barriers to entry into extractive industries (Hennart, 1988). Since vertical integration decisions are made partly for economic considerations, capital intensive nature of natural resources has also been taken into account as an influential element with such decisions and strategies (Acemoglu et al., 2009). While firms in high-tech sector deal with the commoditization of their products as industries matures, the end products of the extractive industries considering the same commodity have always been identical (Beyazay, 2015). Specifically in regard to downstream market, commoditization is considered to influence the vertical integration strategies firms employ (See for example Ossegowitsch and Madhok (2003)).
Finally, agglomeration is discussed to facilitated the vertical integration decisions of firms (Diez-Vial, 2007) but there is little insights on how dispersedness of natural resources can affect such decisions. This is important since mines and deposits of natural resources are scattered in diverse and distant areas and firms need to plan for mobilizing their technological and expertise to reach to them.

Imprinted- Many imprinting researchers have studied organization level imprints. Simsek et al. (2015) categorize prior studied organization-level imprints into 4 categories: cognitions, structures, culture and resources. For instance, in the first category, imprinters influence the content, endurance and scope of organizations cognitive frameworks. In second category, imprinters influence the firm-level structures. And finally, in third category, imprinters impact the culture of organization such as paradigms (Zyglidopoulos, 1999). In our study, we will focus on the first.

Sensitive periods- For this chapter, our attention is on the founding period of new firms established in extractive industries and how the initial natural conditions affect the choice of their ownership structure in their supply chain.

Imprinting process- While we are still in the genesis phase, we will argue how the initial conditions shape the cognitive frameworks of firms as management mindset. We also prefer to discuss the metamorphosis, particularly the persistence process in this section since it will clarify why the imprints initiated influence the vertical integration decisions:

Management mindset- Pioneered by Stinchcombe (1965), imprinting theory suggests that environment stamps particular features onto new organizations. There are several approaches to understand the imprinting process and how it persists through time despite changes to initial environmental conditions. Considered by Johnson (2007) as an agent-
based process, the process of stamping environmental elements is shown to be facilitated by individual agents when they establish their new venture. Certain elements from their historical contexts and environmental conditions are imprinted on individuals who carry them to new ventures and imprint them on their organizations. A recent approach in the literature also considers imprinting to be a phenomenon that takes place on the individual level (e.g. Ellis et al. (2016), Favero et al. (2016)). However, the imprinting of the environment characteristics onto the organization happens through not any people but influential stakeholders such as founders and executives (Boeker, 1988). Prior literature argues the role of “cognition” in shaping the entrepreneur’s mindset (Tetlock, 1990).

Individuals’ mindset is shaped based on the interaction of motivations and inputs from the environment (Haynie et al., 2010). Haynie et al. (2010, p.221) suggest that this interaction is a two-way street where “motives influence how the environment is perceived and interpreted” and “At the same time, environment may define an individual’s motives...” There could be considered two motives that in combination with initial natural challenges and conditions can mould the management mindset in the founding periods that influence the firm strategic decisions for long periods, namely “liability of newness” suggested by Stinchcombe (1965) and “liability of smallness” as noted by Aldrich and Auster (1986). Despite differentiating the effects of these two factors can be empirically difficult, they can affect the new firms process of strategic decision making in order to survive (Kale and Arditi, 1998). “liability of newness” considers the early years of firm formation to be crucial for its survival (Stinchcombe, 1965). Studies show that survival rates for firms in their first five years is much lower compared to those for established ones (Starbuck, 1989, Kale and Arditi, 1998). From an open system view of organizations, Kale and Arditi (1998) argue that liability of newness is associated with establishing firm’s external processes such as setting
new stable ties with outside organizations and acquiring access to the resources in the firm’s environment; and internal processes such as learning and defining new roles and developing internal competences (Stinchcombe, 1965). Therefore, the firms are more susceptible to their environment in the first few years (Marquis and Tilcsik, 2013). Since dealing with internal and external liabilities at birth are of utmost importance to managers (Pennings and Kimberly, 1980), they can leave a lasting influence on how the management mindset is oriented towards management of natural environment’s conditions and constraints. Accordingly, natural environment can also have an enduring effect on the management mindset in how to deal with the liabilities at founding by opting for key strategic decisions. Such an interaction leads to a lock-in a specific mindset that guides the entrepreneurial decision making in focusing on strategies that can achieve desirable outcomes. Therefore, management mindset influences the firm strategies regarding configuration of supply chain by making managerial decisions about internalizing or outsourcing certain activities of the firm.

“liability of smallness” also considers the size of a new organization to impact the its survival chances (Kale and Arditi, 1998). Despite newness has shown to have a stronger effect on failure (Halliday et al., 1987), smallness can arise from restricted financial resources, managerial shortcomings and inability to employ competent personnel. Thus, they can have strategic implication on the firms level regarding supply chain ownership structures (Aldrich and Auster, 1986) by influencing the management mindset.

Although the initial imprints are transmitted through generations of employees and persist despite time passing and environment changing (Marquis and Tilcsik, 2013), they might be subject to decay (Simsek et al., 2015). Ellis et al. (2016) defines the decay process a result of
misalignments between mindset of knowledge transmitters and knowledge receivers.

However, the decay process does not mean radical changes in the content of imprints unless there is a crisis that can make changes onto the initial mindset (Scherpereel and Lefebvre, 2014).

Proposition 1:

*Initial natural environmental characteristics influence the vertical integration decisions that firms make at time of founding.*

Manifestation- Manifestation phase depicts the imprinting impacts on entity’s behaviour and outcomes. Here our attention is focused on the vertical integration decisions of firms. As suggested by (Beyazay, 2015), there are two divisions in the oil supply chain: upstream (that is exploration activities, forecasting, logistical management for delivery of crude oil from remote oil wells to refineries) and downstream (that is from processing of crude oil in refineries to consumable products and distribution). Integrated oil companies are considered to be active at both ends of the supply chain (Beyazay, 2015).
### Table 1. Proposed imprinting framework

<table>
<thead>
<tr>
<th>Phase</th>
<th>Concepts</th>
</tr>
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<tbody>
<tr>
<td><strong>Genesis</strong></td>
<td><strong>Imprinter:</strong></td>
</tr>
<tr>
<td></td>
<td>Natural resource characteristics:</td>
</tr>
<tr>
<td></td>
<td><em>a) Availability</em> the extent to which access to natural resources is limited/approved by natural conditions, governments or ruling authorities*</td>
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<td></td>
<td><em>b) Accessibility</em> the extent to which the natural settings and conditions facilitate the accessibility to natural resources*</td>
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<td></td>
<td><em>c) Commoditization</em> the extent to which the end-product is similar to that of other companies’*</td>
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<td></td>
<td><em>d) Dispersedness</em> the extent to which the producing/extracting sites are far from the production/consuming locations*</td>
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<td></td>
<td><em>e) Capital intensity</em> the extent to which funds are needed to start the exploration and exploitation of natural resources for business purposes*</td>
</tr>
<tr>
<td><strong>Imprinted:</strong></td>
<td>firms in extractive industries</td>
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<tr>
<td><strong>Imprinting Process:</strong></td>
<td>Cognitive framework: Management mindset</td>
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<tr>
<td><strong>Metamorphosis</strong></td>
<td>Persistence:</td>
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<td></td>
<td>Lock-in to management mindset</td>
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<tr>
<td><strong>Manifestation</strong></td>
<td>Impact:</td>
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<td></td>
<td>vertical integration decisions</td>
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**Initial natural environmental conditions:**

Decisions on supply chain configuration are considered as conscious managerial choices (Stonebraker and Liao, 2006). Several studies have shown the impact of firms’ environment on their management decision making process (Stonebraker and Liao, 2006, Kriauciunas and Kale, 2006, Duncan, 1972, Zyglidopoulos, 1999, Burgers and Covin, 2014). Thus, we expect that initial natural conditions can influence firms’ strategic decisions making regarding ownership structures and discussed the imprinting process through which this happens. In this section, we will delve into the effects natural resource characteristics can impose on this process in more details.

**Availability**
Prior literature has considered the resource munificence and scarcity to be influential on the firm level decisions (Zyglidopoulos, 1999, Stonebraker and Liao, 2006, Davies and Walters, 2004). Here, we refer to the availability of natural resources from physical and political views, which are both important factors considering the nature of firm’s operations in this sector. It is noteworthy to say that we refer to physical availability that is determined by the trade-off between the demand of the market and the available resources in the ground. In case the imbalance is in favour of the market demand, there is surplus or munificence; otherwise, there is insufficiency or scarcity. The level of availability of natural resources have a salient impact on the decision makers (Aldrich, 2008). Davies and Walters (2004) discuss that munificent environments motivate managers to seek gains. However, this can only be true if the levels of supply and demand are both high while the supply is relatively higher.

Thus, in environments where the physical availability is higher, the management mindset is focused on long-term profits (Zyglidopoulos, 1999). When natural resources are more physically available, this can provide the firms in the downstream with a competitive advantage. In order to make the most of this initial advantage, which can help improve the survival chances of the firm, managers will be interested in investing in more exploration projects in the upstream (Miller et al., 2006) and at the same time increase their activities in the intermediary and downstream market. Vertically integrating into the intermediary market allows firms to control their lead-time and quality of their deliverables to the downstream market. Also, integrating into the downstream market can improve their understanding of the downstream market needs. The transmission of this management mindset to the following managers will fortify the initial strategic decisions despite environment changing. This can been seen in the oil industry, as Bindemann (1999, p.12) says: “...during the period 1920-35 when a remarkable series of oil discoveries yielded more
supply than the market could rapidly absorb. The result was tough competition in both the retail and wholesale markets as companies saw themselves forced into forward integration to gain and/or secure market outlets.” Also in that period managers saw a growing and highly demanding market in the automobile and chemical industries that used oil and petroleum as their feedstock (Macher and Mowery, 2004) which also reinforced the management mindset for long-term planning and choosing a vertically integrated organizational form which was channelled to the next generations of managers. So, the new firms in the extractive industries in early periods of this industry enjoyed a great advantage from the availability of natural resources which was mapped into their organizational structures for a long time.

Proposition 2a:

Companies in extractive industries that experience initial natural munificence conditions will adopt vertically integrated supply chain strategies.

However, firms established in the periods after the 1970s, experienced additional external forces imposed by their environment. The scarcity issues raised in this period were mostly political and resulted from the nationalization of oil in the Middle-East countries (Beyazay, 2015, Ross, 2012). As suggested by George et al. (2015, p.1600): “What these modern interpretations of scarcity show are that the geochemical or biophysical availability of natural resources is not the focal constraint on resources’ availability”. In terms of scarcity, political forces are not permanent but they are likely to be enforced upon firms any time and last for as long as governments decide. Scarce environments persuades managers mindset to avoid loss (Davies and Walters, 2004). Therefore, managers in new firms prefer to follow exploitation projects rather than exploring without knowing the outcome. They
will also focus on more efficient ways of doing things. Thus, it is expected to be focused on a narrower range of the supply chain to gain better results. Managers might also decide to outsource certain activities to increase the efficiency and decreasing a fixed term investment. This could be seen in the oil industry in the 70s which was the beginning period of outsourcing to Oil Service Companies (OSC) by international oil companies (Baxter, 2009).

**Proposition 2b:**

Highly political forces on the availability of natural resources drives newly formed firms in the extractive industries to adopt a more specialized structure rather than a more vertical integrated one.

**Capital intensity and firm size**

Natural resource industries are known for the capital-intensive nature of their industries where their projects cost billions of dollars to establish (Goldstein et al., 2006, Sadorsky, 2001). Studies show there is a positive association between prevalence of vertical integration and capital intensity of industries (Acemoglu et al., 2009), but there are differences between smaller and larger companies at founding. Capital-intensive characteristic of the natural resources could dictate different pathways for new firms regarding their initial size. One of the most important inherent risks involved in the environment of capital-intensive industries that larger companies face is opportunism. The capital-intensive nature of these industries impacts the mindset of managers in new firms to be more risk averse. Therefore, managers in larger companies opt for a vertical integration mode to buffer against opportunism (Hennart, 1988, Williamson, 1975, Williamson, 1985). This mindset guides the next generations in providing more security to their supply chain by
avoiding high risk exploration projects. This can lead to shift their integration direction towards forward integration.

Smaller firms, on the other hand, are often active in the upstream. This is because exploration mining projects face several other risks than opportunism, as well. First, mining projects are often characterized with higher amounts of capital needed and lower chances of success (Schodde, 2015, Hennart, 1988). Second, it takes a minimum of 5 years for the mining projects to move from the prospecting stage to the exploitation stage (Burgers et al., 2016). This is a long time before making financial profit during which the cash flow is all negative. Third, it happens many times in exploring minerals that exploring for one ore body results in discovery of another type of minerals which have a more capacity for exploitation. Then, the problem is finding available markets and evaluating the exploitation opportunities. Specifically for the exploration activities, higher costs and efforts are not always rewarded with profits. To face with such implications, managers’ mindset is set to choose more flexibility in firm’s activities (Osegowitsch and Madhok, 2003). In order to be more flexible, managers make decisions to specialize in one stage rather than being active in several stages that are chained to one another. This can explain the tendency of larger companies to do brownfield exploration while junior miners (or smaller companies) are more active in the greenfield exploration areas\(^1\) (Schodde, 2015).

Thus, we can conclude that new firm size works as a moderator on the association between capital intensity and vertical integration decision.

**Proposition 3:**
The firm size at founding positively moderates decision to vertical integration of firms in capital-intensive industries. Larger firms in capital intensive industries tend to be more vertically integrated, while smaller firms prefer to be specialized in the exploration end.

Natural accessibility

Some of natural resources are in more accessible sites than others and the natural conditions do not impose a high barrier to their extraction. This is a different characteristic compared to scarcity but highly correlated with capital-intensive inherent in natural resource sector projects. For instance, tin can be found in more alluvial deposits near the surface and it is a more accessible element compared to aluminium in spite of the fact that tin is a more scarce element (Hennart, 1988). Higher barriers to exploration and exploitation of natural resources leads to using more sophisticated techniques and equipment which necessitates assimilation of experience and expertise in different areas. Higher levels of inaccessibility set managers’ mindset towards avoiding spillovers and protecting the expertise. This can lead to avoiding outsourcing contracts in order to keep their competitive advantage in-house (Beyazay, 2015). While the mindset is transferred to the next generation of managers, the accumulation of knowledge regarding exploration and exploitation activities in certain areas and for certain mines and minerals, makes it more difficult for firms to share their information by outsourcing their supply chains.

Proposition 4:

Lower natural accessibility guides new firms to decide on vertical integration.

Commoditization
Despite the need for advanced technologies and equipment for prospecting and exploitation of natural resources, the end-product is often the same. In other words, oil is oil and the extent of investment in the upstream or the complexity and expenses of equipment applied for exploration and exploitation does not add to the value of the end-product in the extractive industries. This characteristic of natural resources could be explained by “commoditization” (Langlois and Robertson, 1989). Managers of new firms that step into such industries face cut-throat competition for finding customers in the downstream which necessitates firms to be more efficient (Aldrich, 2008). So, the management mindset will be oriented towards forcing more control on the supply chain. And this can be achieved through a vertical integrated supply chain. Because it is easier to control for exploration capital, delivery and facing the demands of the market. So, over time, firms will accept projects that are in the direction of their main activities and reject or spin off the ones that are aiming different targets. Thus, all the elements will be oriented in a certain way and next generation managers will face the inevitable choice of continuing the trend.

**Proposition 6:**

*The firms having a commoditized product will select vertical integrated supply chain.*

**Dispersedness**

Being localized gives the firms the opportunity to benefit from specialized services from one another (Diez-Vial, 2007, Holmes, 1999, Diez-Vial and Alvarez-Suescun, 2010). As mines and extraction sites are often in areas far from industrialized concentrated areas and sometimes they are spread in different countries, managers face the risk of opportunism. Because it is risky to hire local services from different companies to provide them with exploration and
exploitation and even transportation services. Also, coordination of these activities requires a substantial amount of funding and time (Osegowitsch and Madhok, 2003). Specifically, when the contract finishes and the provider demands more money to renew the contract. And there are expenses for shifting to a new provider. Considering all these costs, managers decide to assign resources to own the whole supply chain. This can direct the managerial mindset to lock-in the way of thinking that owning is cheaper and less risky. Considering the high amounts of investment for designing such an orientation, following managers also have to apply strategies that keep the supply chain as was designed in the earlier periods.

**Proposition 7:**

*New firms with dispersed extractive sites tend to adopt vertical integration patterns.*

**Discussion**

The main purpose of this chapter is to provide a theoretical link between the firm’s initial natural environment characteristics and its vertical integration decisions. This theoretical link is of interest to two areas of organizational researchers. First, it helps to improve the perspective of TCE and RBV theorists, who argue the historical events and resource heterogeneity influences on the firm’s boundary choices decisions. Second, this theoretical link is of interest to those organization researchers who are examining the enduring effect of environment on the firm strategic decision making.

A synthesized view of TCE and RBV that argues a firm, with heterogeneous assets, integrates a supply chain activity when the required resources and capabilities that argues firms are more likely to integrate activities that require resources and capabilities which are already complimentary to what they have (Argyres and Zenger, 2012). However, historical
conditions can also play a role in determining firm boundaries. Since vulnerability to outside environment conditions is the highest at time of founding, it is logical to think that firms in the extractive industries are sensitive to the natural resource conditions and constraints at time of founding. For these firms, there are several unique characteristics in regard to their relationship with natural resources. First and foremost feature is that their supply chain starts from extracting natural resources and these resources are in fact their end products.

This chapter shows how this double-edged strategic importance of natural resources for firms in the extractive sectors affects the initial strategies at time of founding by employing the notion of imprinting.

In addition, the theoretical link discussed between the initial natural resource characteristics and firm vertical integration decisions provide a new perspective on the application of imprinting theory to firm strategic decision making process. It has been argued that the management mindset formation is the mechanism that can explain how imprinting process happens at time of founding.

**Implications**

A number of implication can be derived from the work presented in this chapter. First, it highlights the potential importance of initial natural resource characteristics on the vertical integration decisions that firms make at time of founding. RBV researchers that have considered the importance of entry conditions on vertical integration decisions have not taken natural resources into account. Instead they have investigated the role of human resources and organizational capital to be influential on the decisions on firm’s boundary, considering the related transaction costs.
Second, considering the natural resource characteristics as sources of imprints on the firms in the extractive industries offers the opportunity to study the double-edged feature of resources. RBV research so far has not considered the impact of resources that are also a part of firm’s end products. This is important since it suggest that other than the initial impact resources have on the firms’ structures and procedures, they can move through the value chain and contribute throughout. This characteristic has so far been neglected by the RBV literature.

Third, While researchers have found a diverse extent of imprinters such as individuals (Burton and Beckman, 2007, Boeker, 1989), teams (Beckman et al., 2007), organizations (Klepper and Sleeper, 2005), and networks (Milanov and Fernhaber, 2009), “Early scholarly work on imprinting focused on the environment as the source, origin, and force for the imprinting process” Simsek et al. (2015, p.293). One environmental imprinting source, that has been constantly taken for granted, is the natural characteristics. This chapter extends the initial environmental imprinting sources to contain initial natural resource characteristics. In a way, it presents a “natural imprinting” view.

This paper has also implications for practising managers. First, it suggests managers of firms in the extractive sectors to be cautious of the initial strategic decisions they makes considering the enduring effect of those decisions on the firm performance and survival. Second, this framework can help them to make better firm boundary decisions regarding the natural resource initial conditions and constraints.

**Limitations and future research**

Despite the salient theoretical link this paper provides, it contains a number of limitations. First, only five characteristics of natural resources are the centre of focus in this chapter.
Second, this is a conceptual paper that provides a number of propositions which could bring more in-depth understanding if they were empirically tested. Third, our focus was mainly on the management mindset as an imprinting mechanism, while there could be identified other mechanisms on different levels of analysis.

Beyond the five characteristics of natural resources that we considered here, there could be other aspects of natural resource to be taken into account as influential factors on the strategic firm boundary decisions. For example, environmental consequences have become an important factor in strategic management (Garrod and Chadwick, 1996). Whether voluntarily or involuntarily, firms have to comply with the environmental protection laws and legislations. While the objective of these laws are to eventually protect the environment, they might have necessitate different levels of action for firms, specifically considering the extractive sector. For instance, level of attention and capital needed for radioactive elements extraction is quite higher compared to coal mines. Beyazay (2015) reports it might take up to 10 years to clean the remaining of a depleted oil rig off-shore. So it is possible that environmental consequences also affect the firm’s strategic decision making process.

A quantitative approach can be employed to test the proposition empirically by operationalizing the concepts of initial natural resource characteristics and degree of vertical integration of firm’s activities. It would also be useful to define relative concepts for operationalization of initial characteristics by considering various commodities and deposits.

Literature has offered use of other imprinting mechanisms as well as management mindset (See for example Zyglidopoulos (1999)). While our attention was limited to the individual level of imprinting process, organizational and collective levels also can offer interesting
insights for the imprinting process. However, the direction of literature on this issue is still one of the hot topics in the imprinting literature.

In conclusion, drawing on imprinting literature this paper provides a theoretical link between the initial natural resource characteristics and vertical integration decisions of firms at time of founding. This link is explained through the mechanism of ‘management mindset’. This paper provides a new perspective in considering the role of resources and capabilities in firm’s boundary decisions.

1 Greenfield exploration activities aim to find mineral deposits in previously unexplored areas or in areas where they are not already known to exist. Brownfield exploration activities look for deposits near or adjacent to an already operating mine. (source: Minerals Council of Australia)

2 By the end-product we refer to the product that is consumed by the customers in the downstream.
References


