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Who Influences Rationalities of Global Regimes?

A Social Network Analysis of Influential Actors in the Water Sector

by

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Abstract This Master's thesis sheds light on influential actors in global regimes. Following the concept of Fuenfschilling & Binz (2018), it aims to answer the question of how global regime rationalities diffuse and where they develop. Based on global elite literature, a new conceptual perspective of studying diffusion of global regime rationalities is introduced. The framework focuses on interlocking directorates, educational background, and prior work experience of decision-makers. In a case study, the theoretical concept is applied to the water sector as an example for an infrastructure-heavy sector. The results of this work find no evidence for interlocks through board members of competing companies in the water sector. However, the findings suggest that global regime rationalities diffuse within educational backgrounds and prior work experience of decision-makers. Supposedly, global elite universities & professional backgrounds play a dominant role in the diffusion of knowledge of actors in global regimes.

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List of Abbreviation

A SA	Acciona SA
AW	American Water Works
BE	Beijing Enterprise Environment Group
CEO	Chief Executive Officer
CFO	Chief Financial Officer
COO	Chief Operation Officer
GPN	Global Production Network
GS	GS Engineering & Construction
GVC	Global Value Chain
HBS	Harvard Business School
MLP	Multi-Level Perspective
MNC	Multinational Corporation
SNA	Social-Network-Analysis
ST	Severn Trent
SU	Semcorp Utilities
UU	United Utilities

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1 Introduction

The European Environment Agency (2020) names long-term sustainability as a core goal to tackle societal problems & environmental issues such as demand for food, water, energy & mobility. In addition, scholars have argued that industrial and societal transformations to more sustainable consumption and production processes are needed (Fuenfschilling & Truffer, 2013). However, the long-term goal of achieving sustainability has turned out to be difficult since social and technological applications in society have become characterized to be rigid and inert (Fuenfschilling & Binz, 2018).

For this matter, academic transition literature has expanded its scope and identified socio-technical systems as having high potentials to study sustainability transitions (Lawhon & Murphy, 2012). Socio-technical systems are defined as a complex connection of social arrangements and technological applications that need a combined analysis (Bauer & Herder, 2009). Researchers argue here that socio-technical systems are very inflexible and path-dependent since certain actors dictate the rule settings of engineering & product processes (Fuenfschilling & Binz, 2018). Literature goes further and argues that networks of these actors form regimes to stabilize the current state of the arts by implementing standards, practices, routines, and rationalities. Up to now, academia uses transition concepts, such as the Multi-Level-Perspective (MLP), to understand transitions in more depth. In this context, literature mostly supports the idea that disruptive innovations happen due to a shift from one regime to another within a simultaneous appearance of micro-niche developments and macro landscape pressure (Geels & Schot, 2007).

However, recent years have also brought up more and more criticism regarding these approaches. Scholars have addressed that these concepts exclude the spatial dimension. (Kanger, 2021). They follow hereby Global Production Network (GPN) literature such as Yeung & Coe (2015) and global polity literature such as Meyer, Boli, Thomas & Ramirez (1997). The authors describe in this context that economic practices and organizational structures have become very similar worldwide. Moreover, Markard (2011) explains that especially infrastructure-heavy sectors such as energy & water tend to revolve around the same technological large-scale infrastructure applications in many countries. In this regard, various research papers have proved that these applications tend to have negative impacts on sustainability issues and exacerbate inequalities in developing countries (Rammelt, 2018; Malekpour, Brown & de Haan, 2017). Yet, Fuenfschilling & Binz (2018) point out that socio-technical-regime theories have, so far, rather focused on national and sectoral levels than on a transnational level.

Fuenfschilling & Binz (2018) have addressed this issue themselves and developed the Global Regime concept. The authors advance within their framework national transition theories by including sociology and human geography and combine them with GPN and Global Value Chain (GVC) literature. This paper takes the framework as a point of departure and argues

that just a few multinational corporations take a lead role in global networks and push for their preferred solutions. The authors further argue that given this explicit methodological focus on national transitions, research still lacks in knowledge in terms of ..." how, where and by whom dominant regime rationalities are developed and where exactly they exert influence" (Fuenfschilling & Binz, 2018, p.737).

This research aims to address this gap in the literature and further deepen the knowledge about where rational views of leading actors emerge and how they diffuse in time and space. For that, the paper argues that insights in this regard may not only be covered by GPN or GVC theories but also from the perspective of global elite literature. Global elites are in this study considered as corporate board members and executive management members of multinational corporates. To shed light on the under-researched topic of global regimes, this thesis poses the following research question: **"How do global regime rationalities develop and diffuse over time and space, and what role do global elite networks play in reproducing dominant regime structures."**

For answering the question, the paper creates a new conceptual perspective to study how rationalities diffuse and where global regime players gain influence. Based on global elite network literature, the paper derives three new sub-streams: First, interlocking directorates diffuse similar knowledge between leading corporations in global networks and, therefore, create similar standards, routines, and rationalities. Second, educational backgrounds in the form of university degrees of decision-makers in leading multinational companies can explain similar socio-technical logics. Third, decision-makers of international companies gain similar "world views" within their previous work experience.

Based on the theoretical framework, the paper splits the research into the following three sub-questions: SQ1: To what extent are regime rationalities diffused by interlocking directorates within multinational companies? SQ2: Does educational background of the global elite influence regimes, and if yes, where do elites gain their influence? SQ 3: What role does prior work experience play in influencing global regimes? The author expects to see a connected network of multinational corporations through their directors and therefore suggest that board members diffuse mutual rationalities throughout multinational companies in the water sector. Moreover, the paper expects to find a connected network of multinational corporations through executive members and their higher education and therefore, explain common rationalities and similar technological trajectories and infrastructure solutions around the globe. And lastly, the research expects that decision-makers of multinational corporations tend to have similar professional backgrounds which leads to the assumption that global elites gain similar worldviews by the status quo of specific economic sectors.

The framework is applied to an instrumental case study of the water sector. The sector is considered a good example since it shows similar global regime-rationalities and highly hierarchical positions of multinational companies. (Fuenfschilling & Binz, 2018). In addition, academic literature explains that the sector is characterized by large-scale infrastructure solutions but shows favorable attributes for smaller and locally implemented sustainable solutions (Binz et al., 2012; Lieberherr & Fuenfschilling, 2016). To analyze the research question, a quantitative Social-Network-Analysis (SNA) of interlocking directorates and educational backgrounds is applied. Furthermore, descriptive statistics of the dataset support

the case study to draw insights into prior work experience of global elite members. Data for interlocking directorates were gathered through the database Orbis and annual reports. An additional dataset of biographical backgrounds of decision-makers of MNCs was created by analyzing internet websites, annual reports, and corporate websites.

In order to answer the central question of this research, the paper uses five steps: Section 2 explains state of the art in transition literature, gives a detailed description of the Global Regime Concept and elaborates the used framework. Section 3 provides a detailed version of the Research Question and includes three conceptual prepositions. Section 4 explains the used methodology and data. Section 5 then elaborates the results and puts the outcomes in the context of global regime stability by using secondary literature before section 6 concludes the findings and points to further research.

2 Previous Research & Theory

This section is divided into four parts. First, it gives an overview of the current state of the art in transition literature and the general concerns of nationally focused research. Second, it gives insides into the concept of Global Regimes and institutional rationalities and actor structures. Third, to understand those actors better, the paper then draws insights into Global Production Network (GPN) and Global Value Chain (GVC) literature. Finally, section 2.2 then introduces corporate global elite networks to give the research a sufficient framing to understand influential actors in global regime networks.

2.1 Theoretical state of the art

2.1.1 Transition literature

Over the last 10-15 years, literature has seen an increasing trend towards studying socio-technical transitions and sustainable technologies (Smith, Voß & Grin, 2010). Several authors such as Geels & Schot (2007) and Boschma & Lambooy (1999) have pointed out that the studies are based on evolutionary economics, political & environmental science, and technology studies. They further explain that this research mainly focuses on showing the mechanisms between socio-economic, technological, and biological systems that react to changes in their surroundings. In this context, Lawhon & Murphy (2012) argue that socio-technical transition theories have high potentials in studying sustainability transitions.

Regarding sustainability transitions, literature and policymakers define the term in various ways but with a similar direction. For example, Markard, Raven & Truffer (2012) define sustainable transitions as " long-term, multi-dimensional, and fundamental transformation processes through which socio-technical-systems shift to more sustainable modes of production and consumption" (Markard, Raven & Truffer, 2012, p.956). According to Bauer & Herder (2009), academic literature refers to socio-technical systems when technological applications and social arrangements are so connected that an analysis of the entire system is required. The authors further elaborate that the technical and social systems consist of subsystems that are intertwined and co-evolve within different times. These subsystems include networks of actors such as firms and individuals, institutions for societal and technical norms or regulations, and knowledge (Geels, 2004; Markard, 2011).

According to Markard, Raven & Truffer (2012), those actors interact together and provide services for society. Moreover, they point out that typical examples for these systems are the energy & water supply or transportation service sector. Bauer & Herder (2009) support this argument by stating that these sectors consist of heavy technological infrastructures and

various public and private actors since it ensures social and economic life. Lawhon & Murphy (2012) further argue that socio-technical systems provide a framework that brings together complex multi-scalar factors that influence development. Additionally, the authors mention that policymakers widely apply it, and it includes spatial aspects from geographers in the form of conceptualization of power, scale, and space. Therewith, the field of sustainability transition aims to explain how sustainable consumption and production can be achieved by supporting socio-technical changes (Markard, Raven & Truffer, 2012; van den Bergh, Truffer & Kallis, 2011).

To study these changes, scholars have widely used the concept of socio-technical regimes. Fuenfschilling & Truffer (2013) point out that the aim of this conception is to explain the rigidity, persistence, or stability of established sectors. They further elaborate that the concept tries to shed light on the questions on why utility heavy sectors tend to change in a path-dependent and slow way. Furthermore, the concept tries to understand why unsustainable solutions persist despite the growing existence of sustainable and superior alternatives (Binz et al., 2012). According to Geels & Schott (2007), the socio-technical regime concept is an extended version of the technological regime concept of Nelson & Winter (1982). They further elaborate that the theory is based on technological trajectories explained by similar routines in an engineering community. Further research then extended this explanation, suggesting that other actors such as policymakers, scientists, and users influenced the technological trajectories (Bijker, 1995). Geels & Schot (2007) then explain that the strong influence resulted in stabilized trajectories, a blind adaption of technical systems, and sunk investments in infrastructures and machines. More recent literature has developed the argument and claims that socio-technical regimes influence the rule set regarding engineering & product processes and the definition of problems (Fuenfschilling & Binz, 2018). In other words, the regime actors implement the standard, routines, practices, rationalities and set the dominant institutional logic within a socio-technical system (Fuenfschilling & Truffer, 2016)

In the context of transition studies, literature claims that socio-technical systems are unflexible and path-dependent due to existing regimes. Geels and Schott (2007) describe transitions as a change from one socio-technical regime to another. Therefore, the authors elaborate on the widely used Multi-Level-Perspective (MLP). They state that the concept includes the transitions on various levels and the interplay of timing and nature. The authors distinguish between three different levels, Sociotechnical-Landscapes, Sociotechnical-Regimes, and Sociotechnical-Niches. In this regard, niches are considered as radical novelties, regimes are considered the business as usual, and landscape as an exogeneous effect (Kanger, 2021). The MLP shows hereby the interaction between the three levels, at which normal innovations develop within regimes, while radical innovations appear solely due to a combination of landscape pressure and niche innovations (Smith, Voß & Grin, 2010).

In terms of studying the transition of socio-technical regimes, various authors point out that literature sets boundaries between sectors that fulfill a specific function such as water, energy, or transportation (Geels, 2011; Boschma et al., 2017). In addition, the empirical literature has focused mainly on the transitions and regime dynamics of specific sectors on a national level (Fuenfschilling & Binz, 2018). Examples of this are the studies of Geels et al. (2016) and Berlo et al. (2017), who studied the national transition of the German energy sector. Furthermore, Leas et al. (2014) study the energy transition by using the Multi-Level-

Perspective on a national level for Germany, the Netherlands, and the UK and comparing the results to each other. Moreover, several recent studies have used the Australian water sector to study socio-technical-regime changes. For example, Brown, Farrelly & Loorbach (2013) explain that they could not find a single cause-effect that shifted the regime in Melbourne's urban stormwater sector. Instead, the authors point out that the interaction between the niche & regime frontrunners and the creation and modification of institutional structures resulted in a new socio-technical system application. (Brown, Farrelly & Loorbach, 2013, p.716).

A more specific example is given by Fuenfschilling & Truffer (2016). In their research paper about the Australian Urban water sector, the authors revealed that institutionalized regime structures highly influence the diffusion of technological innovation. The authors describe that the water sector in Australia has gone through a water crisis in the form of droughts. They further elaborate here that desalination solutions were installed even though experts and environmental organizations have expressed their concerns. In their results, the authors point out that certain actors actively deinstitutionalized regime structures to push for rather less sustainable transition processes. They argue that influential actors such as multinational companies played an important role in this process and were guided by their prevailing rationalities.

However, the MLP concept has been attributed to various criticism throughout the literature. Kanger (2021) summarizes that the MLP received criticism in terms of conceptual obscurity, methodological inconsistencies, and the exclusion of spatial dimension. Fuenfschilling & Binz (2018) also support the latter argument by saying that there are still many unknowns regarding the geographical characteristics of socio-technical regimes. Additionally, Lawhon & Murphy (2012) summarize that socio-technical transition theories need to become less technologically focused and should focus more on the role of spatial factors.

The spatial factor is particularly interesting since Mayer et al. (1997) describe that practices, actors, and organizational fields have become increasingly similar worldwide, even though the surroundings show very different pre-conditions. Initial research has been conducted in human geography and sociology literature, suggesting that cultural rationalities are widely accepted beyond their origins due to a high institutionalization degree (Bunnell & Coe, 2001; Meyer et al., 1997). Research here gives, for example, one explanation, saying that Multinational Corporations (MNCs), Intergovernmental Organizations (IGOs), and scientists strongly shape the institutional structures within a field due to a broad acceptance of authority power (Scott, 2008; Dimaggio, 1991; Hwang & Powell, 2009; Fuenfschilling & Binz, 2018).

Coenen, Benneworth & Truffer (2012) also criticized the shortcoming of geography in transition literature. The authors distinguish their argument in two sections. First, they argue that scholars have often focused on comparative or single-case studies but have not considered if and how geographical context matters in transition. Further, the authors describe that the lack of spatial characteristics overlooks potential advantages or conflicts in broader networks and institutions. They further elaborate that the exclusion of these factors could lead to the assumption that transitions happen anywhere. Hansen & Coenen (2015) further argue that transition studies rather focus on niche innovations but lack understanding of the regime-levels in sustainability transition. They further argue that theories should be revised and

developed in a more geographical setting. Section 2.1.2 now presents a revised framework by introducing the Global Regime concept of Fuenfschilling & Binz (2018).

2.1.2 Global Regimes

Fuenfschilling & Binz (2018) have recently contributed a new theoretical framework to study global regimes and transition processes. The authors developed their idea on literature that suggests that sectors like energy, transport, and water show very similar socio-technical options between countries and that regime rationalities tend to revolve around the same technologies (Markard, 2011). To understand the similar global approaches, Fuenfschilling & Binz (2018) argue that regimes exert their logic within socio-technical systems. They further explain that the focus of the concept lies mainly on institutional rationalities that have been legitimized beyond any single territorial context. Therefore, the authors define socio-technical-regimes as:

"the dominant institutional rationality in a socio-technical system, which depicts a structural pattern between actors, institutions and technologies that has reached validity beyond specific territorial contexts, and which is diffused through internationalized networks" (p.739).

Also, Fuenfschilling & Binz (2018) explain that the more rationalities diffuse in geographical context, the more imitating pressure emanates into the global regime. In other words, as stronger the core rules, norms, and routines diffuse globally, the stronger the global regime. Furthermore, the authors expect to see the strongest global regimes in socio-technical systems where rationalities have become the international standard even though they have diffused in regions with diverse cultural, material, and institutional pre-conditions.

Eventually, Fuenfschilling & Binz (2018) expect to see just a few central actors with a strong influential position in network structures in global regimes. The authors expect that multinational corporations strongly influence regime rationalities' diffusion due to their central positions in global networks and value chains. They further suggest that hierarchical firm and non-firm networks strongly influence the disruption, creation, and maintenance of institutional rationalities in socio-technical systems. Considering the assumptions above, a key question of global regimes is how (and where) regime rationalities form and how they diffuse in space (Fuenfschilling & Binz, 2018). For this matter, this paper argues that literature needs to focus in more depth on the actors within this network. In the following section, actor structures are presented by applying Global Production and Global Value Chain literature.

2.1.3 Global Production Networks and Global Value Chains

In order to understand the actor structures of the Global Regime Theory of Fuenfschilling & Binz in section 2.1.2, this chapter introduces the literature of Global Production Networks (GPN) & Global Value Chains (GVC). The literature mainly argues that service and manufacturing sectors are increasingly organized through economic activity diffusion to

multiple geographic locations (Levy, 2008; Coe et al., 2004). Dicken (2015) & Yeung & Coe (2015) have supported these arguments by pointing out that economic activities and structures are similar throughout the world and connect different places to each other. This gives the paper the possibility to develop assumptions where rationalities of socio-technical regimes emerge and diffuse (Fuenfschilling & Binz, 2018).

Gereffi & Korzeniewicz (1994) explain that Global Value Chains are characterized by global organizational networks that are grouped around a commodity or product. The authors further argue that these objects link enterprises, houses, and states together. Furthermore, Gereffi (1999) points out that multinational companies (MNCs) play a key role in this system, influencing production, supply, and consumption worldwide. Global Production Network (GPN) theory takes hereby a further step by analyzing the linkage of operations to explain how goods are globally produced, distributed, and consumed (Fuenfschilling & Binz, 2018). The literature suggests that different actors have different influences on rationalities, depending on their hierarchical position in international networks. (Kern, 2010). Several authors further explain that MNCs from developed countries, their specialized suppliers, and various intermediate actors form transnational production networks and also implement global diffusion of knowledge, technology standards, and investments (Gereffi, 1999; Coe, Dicken & Hess, 2008). Moreover, Gereffi, Humphrey & Sturgeon (2005) point out that MNCs from developed countries dominate the network governance in most Global Production Networks while suppliers from developing countries take the "minor" role with less bargaining power to push for preferred solutions. They further elaborate that depending on the network complexity in terms of transactions and suppliers, the network is considered hierarchical, leaving the less-powered actors in a confined position.

But not only Multinational Companies diffuse knowledge and influence networks in Global Value Chain literature. McCann & Ward (2010) show that international experts also influence regulations and control. Sengers & Raven (2015) show in their study that the diffusion of bus rapid systems in Bogota can be traced to the spatial mobility of development banks, university experts, academia-driven International Non-Governmental Organizations (INGOs), and investment banks. Therefore, various literature claims that the knowledge or professional state of the arts is clustered in space (Binz & Truffer, 2017). Networks disperse in spatial communities through their members and activities such as trade associations, international expert communities, conferences, or international workshops (Binz & Truffer, 2017; Coe & Bunnell, 2003). However, there is no clear concept on ..." institutionalization processes and through which regime rationalities emerge and shape transition dynamics in various places at once" (Fuenfschilling & Binz, 2018, p.738).

To draw insights in the latter concern of Fuenfschilling & Binz (2018), this section has shown that particular attention needs to be given to different forms of actor-networks and linkages between key individuals. In the next section, I argue that insights in this regard may not only be covered by GPN or GVS literature but also from the perspective of global elite theory. For this, I take global elites as a point of departure and develop a new conceptual approach based on interlocking directorates, educational background, and prior work experience of global elites.

2.2 Theoretical Framework

As aforementioned, the paper uses the global regime concept and GPN & GVC literature to understand why scholars observe that similar norms, routines, and institutional rationalities emerge beyond territorial context. To deepen the knowledge about where rational views emerge and how they diffuse in time and space, I develop in the following chapter a new approach to study where and how influential actors within regimes gain their influence. The goal here is to understand the degree to which companies and individuals are bound together by a common interest, education, personal backgrounds, routines, and degrees of mutuality (Murphy, 2006). For that, the research uses the global elite network literature as a point of departure. I focus on three indicators for assessing how (global) regimes are being constructed: First, the element of interlocking directorates. Second, the influence educational background of decision-makers, and third, prior work experience of global elite members.

In the course of this paper, global elites are defined as "a small sliver of the world's population that has come to control vast amounts of political and economic power, without much regard to national borders" (Friedman, 2018, p.327). Furthermore, economic power is considered in the form of corporate board members and executive management members of multinational corporations. I follow in this regard the idea that executives influence companies' strategic decisions, organizational outcomes, and orientations (Shao et al., 2020). In the following, I give a detailed explanation of all three developed sub-streams to give the paper a theoretical framing of how rationalities diffuse and reproduce globally.

2.2.1 Interlocking directorates

In this first section, I argue that global rationalities emerge and diffuse within interlocking directorates. The paper follows in this matter global elite network literature that focuses mostly on relations between companies by their shared directorates. (Verbeek & Mah, 2020). These interlocks are often defined as a phenomenon when a person affiliated with one organization sits on the board of directors of another organization" (Mizruchi, 1996, p.271). The research of interlocking directorates has been developed in 1905 and has ever since been growing, showing how companies worldwide form networks and are tied together (Everard & Henry, 2002; Battagion & Cerasi, 2020).

Literature then suggests several reasons why these networks exist and how they can be interpreted. Davis, Yoo & Baker (2003) point out that directors are mainly recruited for their experience in geographic closeness. They elaborate that this often demonstrates a system of information exchange that may influence corporate governance and affect market controls. Furthermore, Buch-Hansen & Henriksen (2019) point out that interlocking boards always have an impact on market control if the companies are directly or indirectly competing in the market. Verbeek & Mah (2020) explain that various literature interprets corporate interlocks as an interpersonal phenomenon for serving the so-called capitalist class's interest. Corporate interlocks are hereby used to maintain the elite class connection, integrate new elite members, and facilitate political actions by organizing meeting points for directors within the boards of

companies (Carroll, Fennema & Heemskerk, 2010). This creates mutual rationalities in the form of shared worldviews, identities, and common understandings and, therefore, enables corporates to define and maintain the status quo (Sapinski & Carroll, 2018).

2.2.2 Educational background

As described above, studies of global elite networks have traditionally focused on interlocking directorates. However, this section argues that directorates are not the only relevant network when studying global regimes. According to Verbeck & Mah (2020), the global corporate elite network literature has recently expanded in terms of methodology and scope. Various studies have focused now on connections through institutes, following criticism that interlocking directorates focus just on one possible form of interlocked firms (Carroll & Sapinski, 2010; Carroll & Carson, 2003). Verbeck & Mah (2020) explain that institutes are also important nodes for integrating the corporate elite and constructing similar rationalities across business communities.

For that, I draw in the following part insights from sociology literature. Bloch, Mitterle, Paradeise & Peter (2018) argue in their book, "Universities and the Production of Elites" that elites are co-produced and co-constructed by universities or higher education facilities. Universities and employers build networks that go far beyond normal recruiting events and exchange business knowledge in a specific way (Mitterle, 2018). Furthermore, Mitterle (2018) explains that this phenomenon can be mostly seen in private universities in the US & UK, which provide special pathways such as close collaborations to ease the transition from university to the employment stage. Friedman (2018) point out that the universities appear as incubators where future business and political leaders connect and develop ties and have the possibility to "grow" into the transnational elite class.

By following the presented literature on global elites, I propose an additional dimension to the research of global regimes. In this context, I argue that the university education of decision-makers in multinational corporations affects global socio-technical-regimes. It gives insights on by whom rationalities develop and how this knowledge is diffused across the globe.

2.2.3 Previous work experience

For this third sub-stream, I argue that decision-makers' work experience influences the diffusion of rationalities beyond national borders. This argument is based on the upper echelons theory of Hambrick & Mason (1984). The concept claims that corporates' strategies and outcomes are predicted by companies' executives' characteristics (Hambrick & Mason, 1984). Hambrick (2007) argues that executives are considered the most powerful actors within firms, which helps to understand why corporations behave the way they do. In this regard, the author points out that the theory has two assumptions: First, executives act in terms of their personal interpretations, and second, these interpretations are based on their experience, personalities, and values. In other words, they act in "their" rational view. I argue that these global regime rationalities develop within their previous work experience. I follow

with this Tyler & Steensma (1998), who show in their study that CEOs with experience in working with technological alliances during their career are more focused on building partnerships with other actors to share resources and technical know-how.

Eventually, by combining the upper echelon theory with global regime literature, I argue in this section that previous work experience influences global regime characteristics. Decision-makers influence MNCs based on their bounded rational views. Multinational corporations take the central position in Global regime networks as described in the previous sections and, therefore, influence global norms, routines, and standards in institutional settings and technological choices worldwide (Fuenfschilling & Binz, 2018). It provides the research with an additional theoretical framing to explain the sources of global regime rationalities and sustainable transitions.

2.2.4 Summary

The following part summarizes the chapter to understand better the red thread of this paper's theoretical background and approach. The summary is divided into four parts to illustrate how the theoretical framework of chapter 2.2 builds upon previous literature.

First, academia often uses the concept of the Multi-Level-Perspective and socio-technical regimes to study transitions. But in this regard, scholars have stressed the lack of spatial sensitivity and the insufficient attention to regime characteristics and regime dynamics.

Second, global regimes give insights into spatial factors in transition studies. The focus lies here on institutional rationalities that have appeared beyond any single territorial context. Scholars expect here to see just a few central actors and a strong global network as further it has expanded beyond territories. However, Fuenfschilling & Binz (2018) argue that we don't know much how these logics are diffused and reproduced globally and call for a better understanding of actor-networks.

Third, to understand actor networks better, scholars argue that research needs the lens of GPN/GVC (Fuenfschilling & Binz, 2018). The literature primarily pays attention to formal linkages between firms. It helps to understand the role of MNCs in global regimes but lacks in more informal connections. I argue that particular attention needs to be given to different forms of actor-networks and linkages between key individuals in the global sector.

Fourth, I argue that global elite network literature can provide important insights into the informal linkages. Ties between actors may not only be the ones covered in GPN/GVC literature but also by using the concepts of interlocking directorates, educational background, and prior work experience of decision-makers. Each sub-stream aims separately to shed light on the under-researched topic of how rationalities in global regimes diffuse and where influential actors in the global production network gain their influence. In the following section, I present the overall research question of this paper while I distinguish between each sub-stream to answer the respective sub-question.

3 Research Question

This research aims to shed light on the little researched topic of global regime characteristics by asking where global regime rationalities develop and how these routines and standards diffuse globally. Therefore, the paper analyzes global elite networks in the form of interlocking directorates of multinational companies and the educational and professional backgrounds of decision-makers. To understand the diffusion of rationalities and to analyze which actors hold the most influence, I ask the following question:

RQ: How do global regime rationalities develop and diffuse over time and space, and what role do global elite networks play in reproducing dominant regime structures?

To answer this question, I will split my research questions into the following three sub-questions:

SQ1: To what extent are regime rationalities diffused by interlocking directorates within multinational companies?

SQ2: Does educational background of the global elite influence regimes, and if yes, where do elites gain their influence?

SQ 3: What role does prior work experience play in influencing global regimes?

3.1 Conceptual prepositions

While following the introduced Questions, I expect to see various results that explain the diffusion of rationalities in the water sector:

Proposition 1: I expect to see a connected network of multinational corporations through their directors. The result would prove that board members are affiliated with several boards of competing companies. In addition, it would lead to the assumption that board members share their "bounded" rationality and diffuse mutual rationalities in the form of shared identities, common understandings, and worldviews. Also, I could suggest that global elites define and maintain the status quo in global regimes by influencing transnational corporate structures.

Proposition 2: Considering the elite class production theory in chapter 2.2.2, I expect to see a connected network of multinational corporations through executive members and their higher education. This would explain common rationalities and similar technological trajectories and infrastructure solutions due to the same educational background. Furthermore, I expect to discover that a high share of individuals went to the same educational institutions such as

universities in the US & the UK as described in Mitterle (2018). These findings would explain that similar global technological and institutional rationalities are developed within specific universities.

Preposition 3: Based on the upper echelons theory (Hambrick & Mason, 1984), I expect that decision-makers of multinational corporations tend to have similar professional backgrounds. This would give the research initial characteristics of socio-technical regimes and lead to the assumption that global elites gain similar worldviews by the status quo of specific economic sectors.

4 Methodology and Data

4.1 Methodology

To answer the outlined questions, I use the water sector (water production, supply, and wastewater treatment) as an instrumental case study. Within the study, I apply a quantitative Social-Network-Analysis (SNA) of interlocking directorates and educational backgrounds of global elites. Furthermore, descriptive statistics of the dataset support the case study to identify professional backgrounds of decision-makers in multinational companies to pinpoint influential factors in global-regime rationalities.

4.1.1 Case Study of the water sector

The thesis considers the case study as a suitable method since it allows the analysis to explain and describe the situation while it also enables the author to develop, construct and test a theory (Lee, 1999). Crowe et al. (2011) further explain that it allows researchers to explore in-depth and complex issues in a real-world environment. They further point out that it can help to study a specific case or phenomenon to gain a broader understanding of the issue. It also serves this research as a practical solution since the entire population sampling of multinational companies would be hard to obtain (Zainal, 2007). Furthermore, Flyvberg (2006) argues that a case study may give detailed insights on a single example and provide reliable information for a broader class. Therefore, it helps the study to develop and explore conceptual prepositions, as introduced in section 3. Furthermore, it allows me to generalize the analytical framework as a template to be used to assess other case studies in a similar sector. In other words, I use the case study to understand global socio-technical regimes of the water sector and identify mechanisms that explain how and why things happen and, therefore, answer the research questions in this paper (Anderson, 1998).

For this research, the case is selected purposively. In terms of global regimes, the water sector is considered an excellent example since Hoffmann et al. (2020) explain that the sector shows a particularly strong set of technology standards and societal beliefs that stabilize the current socio-technical system. They further explain that researchers have called for the discovery of global industry structures and ..." the standardized curricula for civil engineers, which strongly prioritize conventional grid-dominated systems..." within the sector (Hoffmann et al., 2020, p.5315). But to this date, very few studies have looked into where and how these actors receive their influence (Hoffmann et al., 2020).

Also, Fuenfschilling & Binz (2018) support the need for further research by referring to the "water market & hydraulic logic." Fuenfschilling & Truffer (2013) explain that the water

sector was for a long time influenced by the hydraulic logic and the engineering community. They argue that the most important factors were the security of water supply to ensure social equity and national welfare by applying efficient technologies. Fuenfschilling & Binz (2018) elaborate that the water market logic changed this approach. They elaborate that emerging neo-liberalization has shifted the control over the water sector from state-owned monopolies towards private ruled actors. The authors point out that economic efficiency has become more important, while users are considered customers, paying the full water usage costs. In this context, they also explain that the market logic becomes deeply institutionalized in various parts of the world. Binz et al. (2012) elaborate that this has also led to various sustainability challenges and problems for new infrastructure developments in emerging countries. The authors further explain that sustainable structures in these countries are considered very important to achieve global sustainability. In this regard, the study suggests that the water sector has a particularly strong global regime and serves, therefore, as a sufficient starting point for analyzing how global elite networks reproduce regime logics (Fuenfschilling & Binz, 2018).

Furthermore, Lieberherr & Fuenfschilling (2016) explain that the water sector is characterized as strongly affected by globalization processes. Furthermore, they elaborate that the sector shows natural monopoly structures since large-scale infrastructures and capital-intensive costs prevent small-scale actors from entering the sector. This also results in highly hierarchical structured global value chains, where multinational companies force smaller actors to overtake common rule-sets, organizational routines, and culture (Levy, 2008; Yeung, 2009). Also, the sector does differ from other infrastructure-heavy sectors such as telecommunication due to its characteristic of being life essential. (Fuenfschilling & Binz, 2018).

Fuenfschilling & Binz (2018) describe that MNCs like Veolia, or Suez (also part of this study), take a lead role in the Global Production Networks and provide water and wastewater infrastructures for global cities and developing countries. They further describe that the regional governance and regulatory framework differ mostly for each place while the regime-rationality in the form of large-scale centralized infrastructures are very similar. This is also very interesting since sustainable transition literature suggests that emerging countries would be relatively favorable to implement more locally and sustainable arrangements (Binz et al., 2012). Therefore, the water sector can be seen as a sufficient example to study global regimes in the form of an instrumental case study. It sheds light on the networks of global regime actors in infrastructure-heavy sectors and allows me to draw assumptions for further research.

4.1.2 Social Network Analysis (SNA)

Within the case study of the water sector, a quantitative Social-Network-Analysis (SNA) is applied to analyze interlocking directorates and educational backgrounds of the companies' executives. According to Wassermann & Faust (1994), SNA has attracted much attention from especially social-sciences to study the relationships between social entities and the following implications of these connections. Stokman (2001) points out that Social Networks Analysis "... studies the behavior of the individual at the micro-level, the pattern of relationships (network structure) at the macro level, and the interaction between the two "... (Stokman, 2001, p.10510). She further elaborates that the network limits or gives

opportunities for individual actors, depending on the structure and position within the network.

For this research, network analysis uses actors, relational ties, and the network itself. Wassermann & Faust (1994) explain that social entities in the form of individuals, corporates, or collective social units are considered as actors. Furthermore, the authors explain that actors are linked to each other by social ties. The ties between the actors within the set are then described as the relation within the social network. The network, therefore, describes the set of actors and their relation to each other based on the given ties. In order to go along with SNA literature, the research will refer to actors as nodes.

To study the diffusion of rationalities and knowledge within the water sector, I apply One-Mode Network and Two-Mode Network analysis. Wassermann & Faust (2019) explain that One-Mode Networks are characterized by showing one set of actors while Two-Mode Networks are showing the relation between one set of actors and one set of events. They further describe that a set of actors can, for example, be multinational companies, and events could represent departments of a major university. They further explain that actors (considered as the first mode) are connected by their "joint affiliation" with events (considered as the second mode).

In this study, actors are considered as multinational corporations in the water sector and events as the universities, university towns, and countries of universities where executives of each company received their degrees. This helps the research to create Social Networks in the form of One-Mode Networks between MNCs to draw insights on interlocking directorates and test preposition 1 and preposition 2. Furthermore, I can draw insights into how MNCs in the water sector are tied to spatial universities and locations and further identify how rationalities diffuse and where rationalities develop as described in preposition 2 (Further description in Chapter 4.2).

The respective social networks are presented by using graphs. This presentation allows the paper to uncover and visualize patterns that have otherwise been undiscovered (Velleman & Hoaglin, 1981). The graphs show either present or absent ties between each actor or event (Wasserman & Faust, 1994). Actors are shown as points in the graph, while connections are shown as lines. Moreover, network graphs are created by using matrices. Wassermann & Faust (1994) point out that these include the same information as graphs but are more useful for computer analysis and are used to form the relevant data to support the coding of the graphs. They further explain that One-Mode matrices show if two nodes in a network are adjacent or not. The authors explain that each row and each column in the matrix contains one actor. Therefore, for each connection between the nodes (actors), the matrix shows 1, otherwise 0. The Two-Mode Network follows a similar approach. Each row attributes to one of the actors, while each column characterizes an event. Thus, for every connection between an actor and an event, the matrix will show a 1, otherwise a 0.

To analyze the most influential key actors in the global regime, I test each network for Nodal Degrees. This method shows how many ties one actor or event has with the others in the network (Wasserman & Faust, 1994). In this context, many ties would lead to the assumption that this actor plays a special role in the network. For example, a university in a two-mode

network with many links to multinational companies could give insights on by whom and where rationalities within the global regime arise. In addition, all One-Mode networks are tested for their density. According to Wasserman & Faust (1994), this method is based on the fact that graphs can have just a limited number of lines, depending on the number of nodes. They further explain that the density of a graph then shows the proportion of lines (connection) that are present in the respective network. The authors further elaborate that this can range from 0, non-lines present to 1, all lines present and is calculated with the following equation:

$$\Delta = \frac{2L}{g(g-1)}$$

at which L represents the number of lines and g the number of nodes.

This helps the research to compare the two One-Mode networks of interlocking directorates and educational backgrounds. In this context, I assume that the higher the degree of the respective network, the more do rationalities diffuse within this channel.

4.1.3 Descriptive Statistics

To shed additional light on where and by whom rationalities develop and answer sub-question 3, I use descriptive Statistics. Descriptive statistics are usually necessary for every quantitative research and are presented at the beginning of the result section (Woodrow, 2014). While we cannot draw insights into a broader population in quantitative studies by using descriptive data, this does not account for using a case study. For this, relevant data in the form of the working experience of executive members and degree subjects are analyzed to explore the backgrounds of global elites. This helps the research to draw clues from the data set and is considered as additional support. Table 1 summarizes the theoretical operationalization of this paper by showing the application of the Social-Network-Analysis and the descriptive characteristics.

Theoretical approach	Method	Measure
Interlocking directorates	Social-Network-Analysis	Joint assignments of directors to boards of companies One-Mode connection between actors
Universities	Social-Network-Analysis Descriptive statistics	Decision-makers education from the same university Subject of university degrees One-Mode connection between actors

		Two-Mode connection between actors and events
Professional background	Descriptive statistics	Professional experience of decision-makers in the same economic sectors Descriptive statistics of the dataset

Table 1 Summary of theoretical approach

4.2 Data

For the analysis in this study, I have created two new datasets. One, for the analysis of interlocking directorates and proposition 1. And the second dataset for the analysis of the educational and professional background of global elites and propositions 2 & 3. Both datasets are combined in one excel file, which can be found by following the link in Appendix A.

4.2.1 Dataset for Interlocking Directorates

For the dataset of the analysis for interlocking directorates, Djamila Lesch (who studies the master program of Innovation & Global Sustainable Development at Lund University) and I conducted research for the biggest and leading players in the water sector. We used the data from the Institute "Global Water Intelligence," which is, according to their website, "the leading publisher and event organizer serving the international water industry for over 15 years". We double-checked the source with our supervisors at Eawag: Swiss Federal Institute of Aquatic Science & Technology. We used as a starting point the Global water intelligence List "People Served," which shows the 50 biggest companies in terms of customers (Global Water Intelligence, 2021). Afterwards, this list was cross-checked with the ten leading water utilities in terms of market capitalization according to the Statistical platform Statista (Statista, 2021).

Additionally, all 50 companies were cross-checked in terms of being active in more than just one country (in this paper considered as multinational companies) and then extracted. In this context, 20 companies from the Water Intelligence List were used for further research (see Table 2). The companies are headquartered in 10 different countries whereat 20% are headquartered in France, followed by 15% in the USA and 10% in the UK, Singapore, China, and Spain. This gives the research a broad perspective since this includes companies from North America, Europe, Asia, and South America, which appear to be active in nearly all continents except Antarctica.

Name	Corporate Website	Abbreviation for this research	Country
Acciona SA	https://www.acciona.com/solutions/water/	A SA	Spain
ACWA Power	https://www.acwapower.com/	ACWA	Saudi Arabia
American Water Works	https://www.amwater.com/	AW	USA
Beijing Enterprise Water Group Limited	http://www.bewg.net/en/tzzgx/	BE	China
Suez	https://www.suez.com/en	Suez	France
Veolia	https://www.veolia.com/en	Veolia	France
Xylem	https://www.xylem.com/en-us/	Xylem	USA
Hong Kong & China Gas Company	https://www.towngas.com/en/About-Us/Other-Business/Hong-Kong-and-China-Water-Limited	HK & China Gas	Hong Kong
China Everbright Environment Group	https://www.cebenvironment.com/en/global/home.php	Everbright	China
Eranove	https://www.eranove.com/en/	Eranove	France
FCC Aqualia SA	https://www.aqualia.com/web/aqualia-en	FCC	Spain
Hyflux LTD	https://www.hyflux.com/	Hyflux	Singapore
Jacobs	https://www.jacobs.com/capabilities/water	Jacobs	USA
Manila Water Company	https://www.manilawater.com/	Manila	Philippines
Sabesp	http://www.sabesp.com.br/	Sabesp	Brazil
Saur-EQT	https://www.eqtgroup.com/Investments/Current-Portfolio/saur/	Saur	France
Semcorp Utilities	https://www.semcorp.com/en/	SU	Singapore
Severn Trent Water	https://www.stwater.co.uk/	ST	UK
GS Engineering and Construction	http://www.gs.co.kr/en/branch/gc-ec	GS	Korea
United Utilities	https://www.unitedutilities.com/	UT	UK

Table 2 Company list

After finalizing the respective company list, I manually extracted the board of directors from the database Orbis" Bureau van Dijk." According to Verbeek & Mah (2020), the platform provides standardized information of over 300 million companies globally for cross-border comparisons. Afterward, the data were cross-checked with the latest annual reports of all companies. Board members were accordingly changed and double-checked if the data list from Orbis and the current websites showed different results. Furthermore, every company's chairman was identified in the latest annual reports and marked separately for further analysis.

In order to study interlocking directorates over time, I searched for annual reports for every company for the years 2016, 2012, and 2008. This is considered to give the research a good overview of changes in the respective companies' board over time. Older reports than 2008 were considered as too hard to find. I then saved the reports to an external memory, and I extracted all board members manually into an excel file and listed them with the respective year to every company. The search was done by using google.com, Bloomberg.com, corporate websites, annual reports, and the search engine web.archive.org/. The latter was used for finding archived internet websites of certain corporates who appeared to have changed their internet path. For the companies Eranove, GS Inima Environment & Saur-EQT are no data previous than 2012 available but were kept in the data set to analyze current directors. The data were then double-checked for a coherent way of spelling, and middle names were shortened to their first letter. In total, the dataset consists of 20 companies with 76 datasets of board member constellations over time and 818 individual board members. In addition, I cross cross-checked the data with 20 company websites and 60 annual reports.

4.2.2 Dataset for professional background

Another dataset for the social network analysis of the educational and professional background was created. I use the same companies as previously described to have a coherent dataset in terms of corporations in the global regime. For each company, I included information about the executive members in the form of CEO, CFO, and COO. The executives were chosen since these positions are the primary strategists responsible for choosing the respective alliance partners and developing the corporate strategy (Tyler & Steensma, 1998). In addition, all chairman of the respective boards are included to create an additional layer of decision-makers in the dataset. For companies that did not explicitly rank their executives as CFO or COO, I searched on their corporate websites for responsible management positions with influence on investment or operational decisions. (Detailed information in Appendix B). Moreover, Acciona SA, ACWA Power, Veolia, Hyflux & China Environment Group employ the position as Chairman and CEO with one individual and are therefore included just with three positions in the dataset. Together, the dataset consists of 75 individuals and their relevant background information.

In order to create the dataset, I searched for information about every member's education (bachelor, master, Phd, executive certificates) and previous work and memberships on different boards. For this, I used search engines google.com, Bloomberg.com, Marketscreener.com, and corporate websites, annual reports, and wikipedia.com, including the referred articles. Relevant data were all gathered in one excel file, separating the information into columns, including the respective sources. The excel file contains 14

columns: the Name of the executive or Chairman - the current company of our dataset – Nationality – Position – Gender – University – Subject – University Town – University Country – Previous Company – Company Character – Sector – Source (Detailed explanation on Appendix B). All in all, the dataset represents 423 rows with relevant information.

While gathering the data, the following strategy was applied: From Bloomberg.com, I always used the given board membership, career history, and education information. I scanned the text at Wikipedia for career history information and went to the referred article to cross-check the data. I went to the corporate websites and used information given regarding board members. Since this study's special interest lies in the professional backgrounds, I gave previous companies sectoral attributes. Therefore, cross-checked data for these companies on their corporate website and then grouped into their respective sectors such as Finance, Infrastructure, Water Management, Politic or Oil & Gas (Detailed explanation of the grouped data are attached in Appendix A). Company websites that could not be found were excluded from the further analysis. Moreover, since this study wants to shed light on the backgrounds of global elites, I did not include the current positions for each chairperson and executive member.

For the relevant section of educational background, I cross-checked every university for its location using google maps. Universities outside of rural surroundings are considered to be located in the next bigger city to develop potential clusters during the study. Moreover, study subjects such as executive training and business administration were considered as management.'

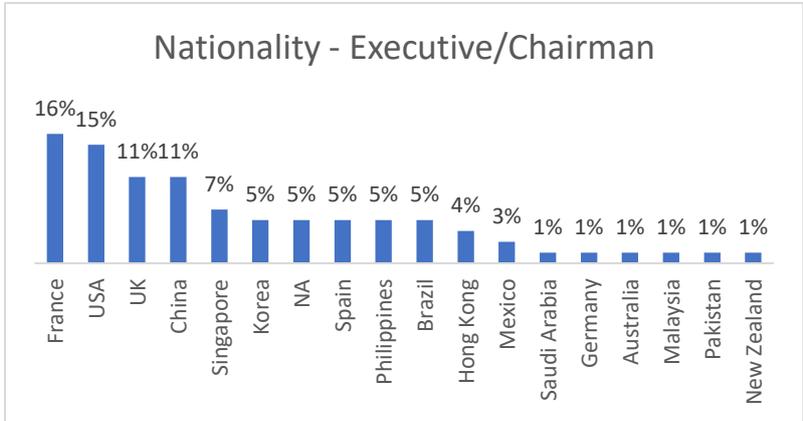


Figure 1 Nationality - Executive/Chairman

In terms of characteristics of the data, figure 1 shows that the sample size of 75 executives and chairman represent 17 different nationalities, whereby the most executives of the sample have France, USA, and China as their nationality. Furthermore, it is important to note that some companies are slightly underrepresented in the dataset. The chairman of Acciona SA (Spain), Veolia (France), China Environment Group (China), Hyflux LTD (Singapore), and Jacobs (USA) are also employed as CEOs, and the companies are therefore just represented with three individuals in the dataset.

4.2.3 Data Process

For the further process in this thesis, I created two one-mode matrices. One matrix for showing the results of interlocking directorates and one matrix for the process of education. For the analysis of interlocking directorates, I created an edge-list between companies and board members in a separate file. Individuals of the dataset were listed in a column and then attached to the respective company in a second column. The edge-list was then imported into R and plotted as a graph. The figure then helped me to identify connections between companies. The observed connections were then transferred into a matrix, including a 1 for each tie between two companies. All other fields were filled with a 0. The data were then further imported in R, where I formatted the data as a data frame before I graphed the data as an undirected one-mode network. This gives us a coherent overview of which companies are connected.

A similar approach was used for the process of education and sub-question 2. For that, I used the dataset for professional background and the variable *universities*. The original dataset was filtered for each university and included a 1 in the matrix for the companies which were connected in each case. All other empty fields were filled in with a 0. The data were cross-checked twice in order to avoid any mistakes. Moreover, the connection between the companies themselves was removed to avoid unnecessary loops in the graphs. The data were then imported in R and formatted as a data frame and graphed as an undirected one-mode network. After that, I coded the degree between the vertexes (the nodes) in order to find out the most central actors in terms of edges (ties). As the last step, both One-Mode graphs were coded in terms of their density.

Moreover, I created three Two-Mode Matrices to understand in which towns and countries the executives and chairman of the 20 companies have gained their education. Therefore, I used the variables *university*, *university town* and *university country*. When the matrixes were created, the first column was filled with all company names, and the first row was filled with existing university/countries/towns. I filtered the data set for each university, university country and university town and again included a 1 for connection in the respective matrix. All empty fields were filled with a 0, and the data were double-checked again. Using a two-mode network, I could create a Social Network Graph showing the connections between companies and the countries and towns. Furthermore, I can show the most central universities/countries/towns by identifying the highest number of edges. This data was imported into R, where graphs were plotted by forming the excel matrices into square matrices. The data were then coded as undirected graphs to show the edges between the companies and either country or town. I further analyzed the degrees of the nodes to identify the most central universities, cities, and countries.

Furthermore, descriptive characteristics of the data set are considered to be relevant for answering sub-question 3. I calculated the variables *sector* and *subject/university degree* of the executive backgrounds and plotted the results as diagrams. Since individuals in the dataset have often worked for more than one company in the same sector, multiple sectors were excluded. For example, if an individual has worked for three companies in the water sector in his/her career, I just included the water sector as one observation for the person. This helps the research later to give coherent results about the share of decision-makers for each sector.

Regarding educational subjects of the individual's degrees, I summarized all engineering degrees as one category to show a comparative difference between management and engineering-driven degrees. This gives the data an additional overview of global elite backgrounds and helps to understand where knowledge and rationalities develop. All matrices are included in the same excel file as the dataset, which can be found by following the link in Appendix A.

5 Results & Discussion

5.1 Results & Analysis

This section shows the obtained results of the process described above. I divide the result part into three sub-sections: First, I start by showing the analysis of interlocking directorates to answer preposition 1. Second, the results of educational backgrounds are then presented to answer preposition 2. In the third section, I present the descriptive statistics of professional backgrounds to draw insights for preposition 3. This gives a good overview of global regime characteristics in the water sector before discussing the result in more depth.

5.1.1 Interlocking directorates

Figure 3 shows a network in terms of interlocking directorates between multinational companies in the water sector. The graph is coded as a circle diagram to present the network clearly and understandably. The results show an isolated network of transnational conglomerates in the water sector. Just Suez and Saur-EQT and the companies Veolia and FCC Aqualia SA share a common board member between the years 2008 and 2019. FCC Aqualia SA and the Veolia group share Mr. Henri Proglino as a shared board member. Mr. Proglino served as a CEO for Veolia and sat on the Veolia group board until 2008 before he changed positions to FCC Aqualia SA. The companies Saur-EQT and Suez share Mr. Jean-Francois Cirelli as a common board member who served on the board for Suez until 2012 before he started to sit in the Board of Saur-EQT.

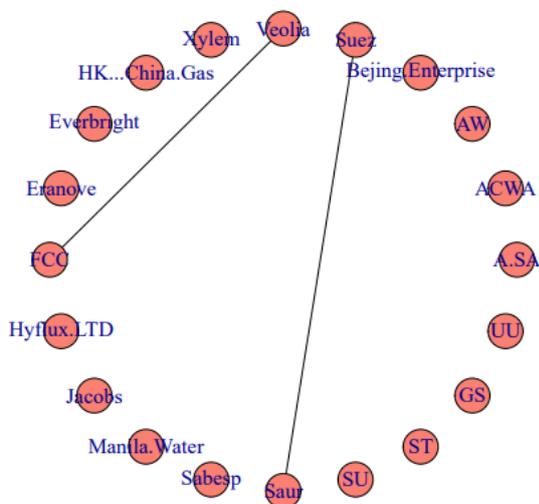


Figure 2 One-Mode Network Interlocking Directorates

Therefore, the result shows that within 11 years, 4 out of 20 companies shared two board members. In addition, the graph density consists of 0.01052632 out of 1, which this paper considers as very low. The analysis suggests a small cluster between the French companies. Out of four connected companies in the sample, three are based in Paris (France) and one in Madrid (Spain). But all in all, the findings do not support my expected preposition 1. The theory of interlocking directorates cannot explain the diffusion of institutional rationalities and similar technological applications of norms, routines, and standards in the water sector industry. It rather shows an isolated network with no connections between the companies.

5.1.2 Educational Background

In terms of educational background, figure 3 shows the network of the 20 sample companies. In comparison to figure 2, the graph shows a more integrated network at which the density of the graph is 0.1736842. Just Acciona SA (A SA), United Utilities (UU), and FCC Aqualia SA have no connection to the network and are completely isolated. The most links to other companies has the Hong Kong & China Gas Company who shares transnational connections to 10 companies in China, France, Philippines, Brazil, Singapore, Saudi Arabia, UK, and the USA in terms of the backgrounds of their decision-makers. Semorp Utilities (SU) and Severn Trent Water (ST) have the second-highest degree with 7 edges to other companies, followed by Manila Water Company, Eranove, and American Water Works (AW), which shows 6 connections to other Multinational Companies in the Water sector. By analyzing the degree of universities, Table 3 shows all universities with a degree of 2 or higher. The full list is attached in Appendix B. Harvard University has the highest share, connecting 6 companies through their chairman and executive members. The University of Cambridge, Standford University, and Tsinghua University connect 3 MNCs, followed by twelve other Universities that connect two.

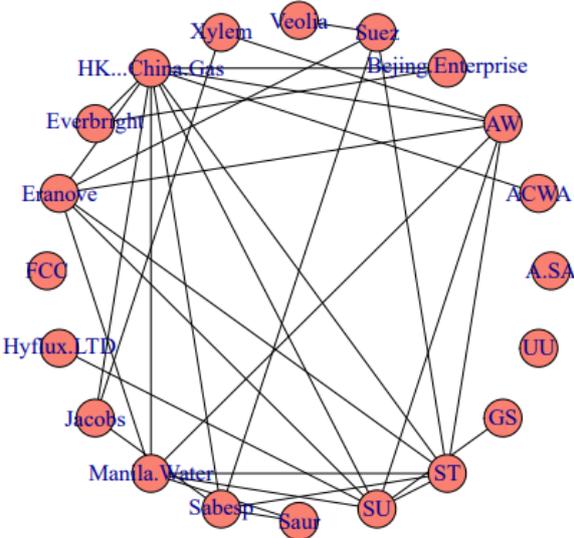


Figure 3 One-Mode Network Universities

University	Degree
Harvard University	6
University of Cambridge	3
Stanford University	3
Tsinghua University	3
University of Ottawa	2
University of Michigan	2
London Business School	2
IMD Business School	2
University of Hong Kong	2
University of Manchester	2
INSEAD France	2
National.University.of.Singapore	2
Ecole.Des.Hautes.Etudes.Commerciales.de.Paris	2
Ecole.Nationale.Des.Ponts.ET.Chausees	2
Ecole.Polytechnique	2
Paris.School.of.Business	2

Table 3 University degrees

These results support proposition 2 and lead to the assumption that similar rationalities in global regimes can be observed due to the educational background of decision-makers in multinational companies. In this regard, the Harvard University would have the highest share of influence on rationalities within the water sector, having a connection to about 30% of the sample size. Followed by the universities in Table 1. Furthermore, the result also suggests that companies such as Hong Kong & China Gas Company (which show the highest degree) gain similar influence as 50% of all other companies. However, these connections can be seen as indirect links since the results do not show if the executives have been studying there at the same time. I rather suggest that these decision-makers have gotten engrained with similar worldviews by their education. In addition, the results expose new links between actors in global regimes, which would not have been visible with GPN & GVC literature.

By analyzing figure 4 and figure 5, I can draw further insights into the geographical location diffusion and reproduction of global rationalities. Figure 4 shows hereby a Two-Mode network of cities (blue nodes) as events and companies (red nodes) as actors. The network was coded to show all labels for nodes with a degree of 2 and higher to present the most important cities.

Figure 4 shows that Boston, Paris, Cambridge, Stanford, Hong Kong, and London are the main cities that connect MNCs. Boston connects the most companies with 8 edges, followed by Paris with 4 edges and four other cities with 3 edges. Boston consists of Harvard University, Tufts University and Harvard College and Paris consists of Ecole Polytechnique, Mines Paris Tech, Ecole Nationale des Ponts ET Chausees, Paris Dauphine University, Paris School of Business, and Ecole Des Hautes des Etudes Commerciales de Paris. Also, it is important to note that these Universities just connect the French companies Suez, Veolia, Eranove, and Saur-EQT. Furthermore, the French multinationals Veolia and Suez are both connected to Universities in Cambridge. On the other hand, Boston connects companies from the USA, France, the Philippines, Hong Kong, and Singapore. In addition, the graph shows

actors are connected through French Universities (the entire list is attached in Appendix B). In this example, the graph shows somewhat regional clusters, having the USA and UK as central events. Around the center, the network indicates that Spain has two connections to Spanish-based companies, Acciona SA and FCC Aqualia SA, while China and Hong Kong just have surrounded companies in the form of Beijing Enterprise, Hong Kong & China Gas Company, and China Everbright. Furthermore, France shows connections to the four French companies and to Manila Water Group.

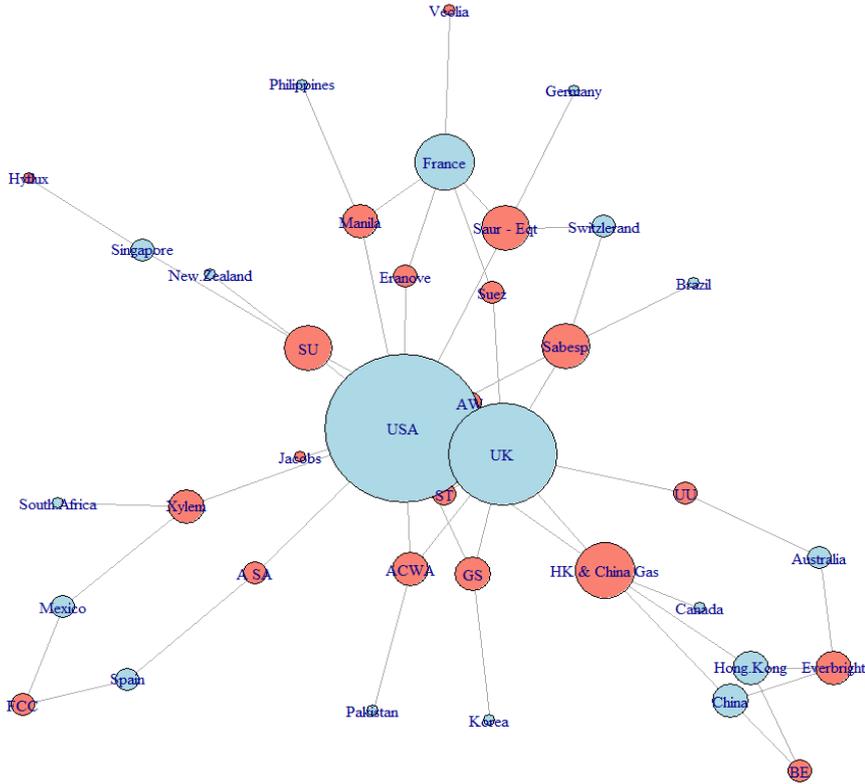


Figure 5 Two-Mode Network Countries

Therefore, figures 4 & 5 give further insights on preposition 2 and support the idea that rationalities develop & diffuse within certain universities in the USA and UK. Based on all results in this sub-chapter, I can assume that especially Boston and universities in the USA have the strongest influence on global rationality diffusion in the water sector. I can further argue that universities in the UK also substantially impact Global MNCs while Spanish companies and universities have less connection to the Global Regime network. Also, figure 5 allows me to assume that Asian-based universities rather form a cluster within Asian companies but do not influence rationalities globally. Additionally, the data enables the paper to argue that universities based in Paris seem to form a cluster with French-based companies.

Figure 6 gives additional insights on the educational background of global elites. The graph shows that 43% of all decision-makers have obtained a management degree. This accounts for degrees such as business administration, MBAs, or special executive training. Also, 21% of all decision-makers have received an engineering degree. As introduced earlier, engineering

degree accounts for civil engineering, environmental engineering, petroleum engineering, and general engineering, whereat civil engineering had the highest share. Other subjects are rather less found in the backgrounds of the dataset, showing 10% of all individuals obtained an economics degree and 8% a finance-related degree if the subjects Finance and Accounting are summed together.

By analyzing the descriptive characteristics, I can further draw insights on sub-question 2. The results claim that a major share of all decision-makers have similar backgrounds since they obtained either management-related and/or engineering degrees. As briefly introduced in section 4.1.1. it seems important to note that Fuenfschilling & Truffer (2013) have correlated the engineering profession with the hydraulic logic and management, finance, and accounting with the water market logic. In this context, engineering degrees would rather suggest a hydraulic logic with a focus on efficient technologies to ensure water security and supply. On the other hand, management-related education would suggest a focus on economic efficiency. The data it this research show that the educational background of current leaders in the water sector is a mix of both logics, with management being the more dominant background. Thus, I argue that global regimes in the water sector are rather influenced by the water market logic and follow economically efficient technologies such as highly centralized infrastructures.

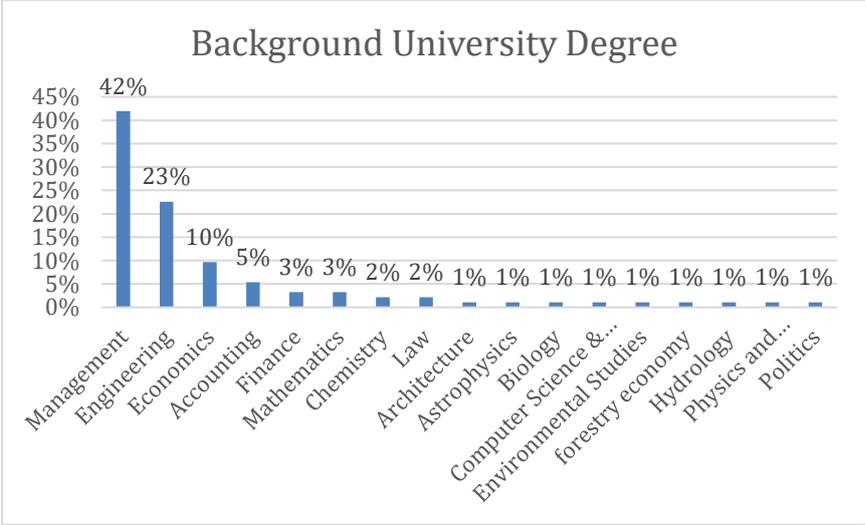


Figure 6 Background University Degree

5.1.3 Professional Background

The sectoral background chart (Figure 7) shows the percentage of how many individuals have received professional experience in a respective sector during their previous careers. The dataset shows that 13% of all individuals have previous experience in the finance sector and therefore have worked in either banks or investment firms. Furthermore, 9% have worked for energy providers and 8% in the water & energy sector. In total, 17% have therefore experience in the energy sector, and if we combine these results with the water sector, we can say that 23% of all individuals have experience in either the energy or water sector. Furthermore, 7% of all individuals show a background in infrastructure sectors which mostly

account for construction companies or infrastructure service companies such as motorway operators. Another interesting characteristic can be observed by looking at oil & gas and education. 5% of all decision-makers in multinational companies show a professional background as members of Oil & Gas providers, and another 5% show backgrounds in education. The latter is mostly characterized by the membership of university committees or positions as professors.

One finding I would like to point out is that a major share (36%) of the decision-makers of multinational corporations in the water sector have a background in 'infrastructure-heavy' sectors. Therefore, I can partly prove proposition 3 and argue that a major share has gained experience in similar sectors. As described Fuenfschilling & Binz (2018), these sectors follow a similar development logic with strong regimes and highly capital intensive, centralized infrastructures. In other words, the energy, water, and oil&gas sectors are all considered to have comparably strong regimes as the water sector. In this context, it might be that core regime logics are transferred between different infrastructure sectors and can partly explain the diffusion of rationalities.

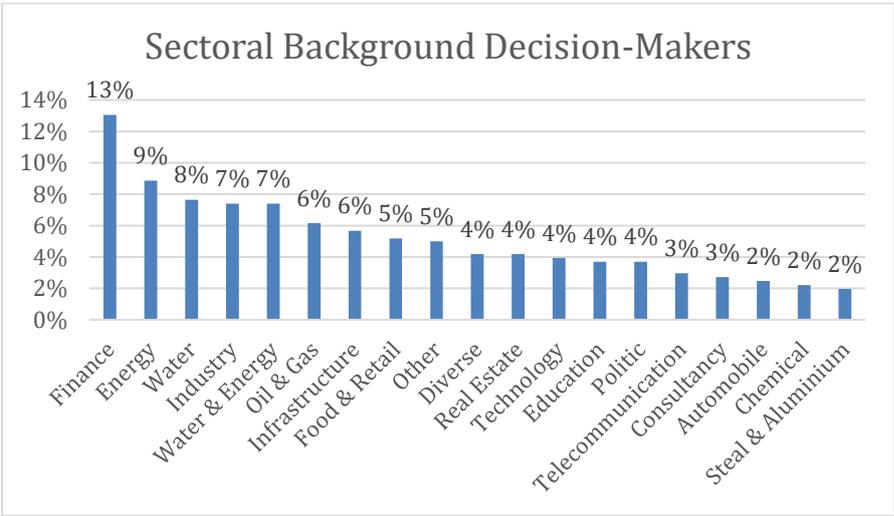


Figure 7 Sectoral Background Decision-Makers

5.2 Discussion

In the course of this case study of the water sector, the research provides insights into the under-researched topic of how and where similar global regime rationalities develop and diffuse. In the theoretical part of this study, I suggest that diffusion of rationalities within global regimes does happen through interlocking board members and professional backgrounds of decision-makers within multinational companies. In the same context, I suggest that decision-makers develop these rationalities within their higher education degrees (in universities) and within their previous work. Moreover, I argue that the similar worldviews of decision-makers are partly responsible for why we can see similar economic and technological applications in infrastructure-heavy sectors worldwide (Markard, 2011).

Therefore, this chapter aims to discuss the obtained results in more depth and bring them into context to global regime literature.

The results of this article cannot find evidence of interlocks through board members between competing companies in the water sector. It differs, therefore, somewhat to similar articles from other infrastructure-heavy sectors. For example, Verbeek & Mah (2020) have shown in their study about the petrochemical sector that all companies from the US and Europe were interconnected through their board members. Although the authors used a wider dataset in terms of time, I can conclude that infrastructure-heavy sectors do not necessarily show these attributes. The analysis rather suggests that board members change their positions outside the water sector or stay for a longer time with the same company. By observing that, we can answer the in section 3 stated sub-question 1 and say that interlocking boards do not seem to be the main channel of rationality diffusion in the water sector.

I presented different results in terms of interlocking MNCs through their decision-makers and their educational backgrounds. While the analyses for interlocking directorates did not show integrated networks, the background of decision-makers seems to connect MNCs companies in the water sector. In other words, the results of the Social-Network-Analysis answer sub-question 2 by suggesting that diffusion of global regime rationalities happens within higher educational institutions. These findings support Bloch et al. (2018) and Mitterle (2018), who argue that elites are produced by certain universities.

Furthermore, the findings support the claim of Bloch et al. (2018), who argue that most global elites are "produced" in universities in the USA & the UK. In this research, about 65% (13 out of 20 companies) are connected through universities in the USA, and about 45% (9 out of 20 companies) are connected through universities in the UK. Under the assumption that higher education shape students in terms of civic, social, intellectual, spiritual, and moral aspects (Braskamp & Engberg, 2011), I assume that these institutions directly influence the rationalities of their graduates. In other words, I argue that a major part of rationalities are co-constructed and diffused within universities in the USA and the UK. More specifically, the findings suggest that about 30% of all MNCs are connected through the Harvard Business School (HBS).

In this context, I suggest that it is important to study the curricula of the leading institutions to understand how similar rationalities are potentially developed. Contardo & Wensley (2004) explain that the Harvard Business School uses the "HBS case method" to teach their students their ... "three business ideologies – managerialism, institutionalism, and American capitalism" (p.212). The authors further explain that these case studies result in standard knowledge since cases are taught in a package where managers differentiate between good and bad products. In other words, single cases are used to differ if certain solutions are appropriate for situations or not and standardize an explanation of what business should be. Contardo & Wensley (2004) further explain that the approach of HBS case studies has gained influence in business schools all over the world. Especially for the UK, Smith, Baston, Bockock & Scott (2002) explain that the US had an important role in developing higher education policies in the UK. Considering that the major share of MNCs are tied to universities in the US & the UK, and half of all decision-makers gained a higher education degree in management, I assume that a high share of the individuals received their knowledge

in the form of the case study approach. In that respect, I also argue that decision-makers in the water sector are rather influenced by the water market logic of Fuenfschilling & Truffer (2013), as introduced in the result in section 5.1.3.

Following the logic of global elite literature and the presented results, I can argue that universities diffuse and indirectly influence global regime rationalities. The conclusion is based on two logics: First, universities diffuse and influence rationalities of decision-makers of multinational companies in the water sector. Second, management members influence MNCs' orientations, strategies, and organizational outcomes (Shao et al., 2020). Following the logic of the Global Regime concept, I argue that these multinational corporations globally influence the rationalities of the socio-technical system and create, impact, and maintain institutional rationalities and decisions for technology standards across the world (Fuenfschilling & Binz, 2018). Considering the previous paragraph's argument, I can assume that HBS case studies and the 'water market logic' indirectly influence global regime patterns. This leads to the conclusion that regimes follow more capitalistic approaches and economically efficient technologies. Furthermore, it would explain the continuous adaption of rather unsustainable, centralized, and large-scale infrastructure solutions in infrastructure-heavy sectors around the world (Fuenfschilling & Binz, 2018).

Moreover, the results of descriptive characteristics of sectoral backgrounds can give further insights on sub-question 3 and the role of prior work experience within global regimes. By following the introduced echelons theory of Tyler & Steensma (1998) in section 2.2.2 and combining them with the given results, I suggest that at least one-third of the executives adapt their knowledge partly from state of the art in Oil & Gas, Energy, and Water companies. Since these sectors are characterized by large-scale & centralized infrastructures (Fuenfschilling & Binz, 2018), I assume that executives of central actors of GPN adopt the same solutions to the water sector. This would lead to the assumption that regime logics are transferred between infrastructure-heavy sectors and can explain the diffusion of similar standards and logics. This surely needs further research to understand the adaption of technologies further, but it gives a first insight into why we can see similar global technology standards.

In this discussion, I also want to pay additional attention to the French MNCs. As described in section 4.2, French conglomerates account for 20% of the biggest transnational active companies. Additionally, the SNA of countries shows that all four French companies revolve around the same three universities in Paris. In this regard, Zanten & Maxwell (2015) explain that elite education in France is seen as a public good that is mainly arranged between the elite, the elite education tracks, and the state. They further argue that the French state has created a segregated higher education system where leading actors have maintained their state of the art and shaped the education of the growing upper class. This educational system and the observed clusters of the results lead to the assumption that decision-makers of French companies develop rationality mostly based on French upper elite education. Furthermore, if Veolia, Suez, Eranove, and Saur-EQT are considered multinational companies with far-reaching influence, it may be assumed that the French status quo diffuses all over the world.

5.3 Limitations

The research has some limitations which need to be considered while drawing conclusions. First of all, the use of an instrumental case study in the water sector must be treated with due caution. Even though the water sector can be seen as a sufficient example for infrastructure-heavy sectors, there are some concerns in terms of putting these results in context to general global regimes. According to Crowe et al. (2011), case studies have been criticized as hard to generalize. The authors further explain that these concerns can be solved by addressing three issues: theoretical sampling, respond validation (participants checking for accurate findings), and transparency throughout the process.

In terms of sampling, I argue that the sample size of 20 companies might not represent the entire water sector. However, all 20 companies are carefully selected in the context of the Global Regime Theory since they represent the biggest transnational active actors in Global Production Networks. In addition, all data were cross-checked with Chrisitan Binz and the Eawag Aquatic Research Institute and, therefore, considered as "respond validated." Thirdly, transparency is considered to be sufficiently documented in chapter 4. Furthermore, as introduced in section 4.1.1, a case study allows the paper to provide an 'analytical generalization' and let me carefully argue that similar infrastructure sectors like oil & gas or energy might feature similar regime dynamics (Flyvbjerg, 2006).

In addition, the dataset flaws in terms of data of interlocking directorates since I could just collect data from years 2008 and onwards. Moreover, it flaws further due to some missing information regarding the companies Xylem, Eranove, GS Engineering & Construction, and Saur-EQT. Furthermore, data regarding the backgrounds of decision-makers are not coherent since different amounts of data were found for each individual. The dataset is still considered to contain enough information to represent the global elites in the water sector. It consists of the 20 biggest globally active MNCs in the Global Regime and their main decision-makers.

Lastly, the SNA networks and descriptive characteristics in this study have limitations in their combined results. The outcomes help to argue where rationalities develop and how they diffuse over space. However, the findings do not allow the study to draw further insights into the strength of ties and qualitative matters. Further research could focus more on the individual ties of big MNCs to the universities. In addition, scholars could focus on management and engineering degrees in certain universities and their links to respective companies and combine the results with this study. This would help the Global Regime Theory to discover where and by whom rationalities develop and how these results have shaped the water sector.

6 Conclusion

Recent literature about socio-technical regimes has sparked discussion about the lack of spatial factors in transition research. Scholars have argued that similar technological applications are globally used, and regime actors seem to implement rationalities regarding standards, routines, and institutional logics in engineering and product processes (Fuenfschilling & Truffer, 2016; Fuenfschilling & Binz, 2018). Especially infrastructure-heavy sectors such as energy, water, or telecommunication have shown these characteristics (Markard, Raven & Truffer, 2012). Yet, theoretical frameworks such as the widely used Multi-Level-Perspective have failed to explain transnational geographical characteristics of regimes (Fuenfschilling & Binz, 2018). Since there is little knowledge about the cause of this phenomenon, this research has shed light on where and by whom rationalities within global regimes develop and how they diffuse over space. It further gives insights on how it can affect sustainable transitions and how further research could contribute to this matter.

In order to answer the posed research question, this paper follows the recently developed Global Regime concept of Fuenfschilling & Binz (2018). Therefore, the paper responds to the spatial critic and argues that multinational corporations influence regimes globally and do push for their preferred solutions. The global regime concept is then combined with global elite theories to explain where multinational companies receive their influence and "bounded rational" thinking. For that, the research developed a new conceptual perspective that is separated into the following three parts: 'interlocking directorates,' 'educational background,' and 'prior working experience.'

For the concept of interlocking directorates, I argue that similar rationalities diffuse in the form of directorates who have sat on the same boards of companies. For educational background and prior working experience, the paper is based on two important facts: First, executives and chairman of the board are considered as global elite. Second, I take upon Shao et al. (2020), who point out that executives influence organizational outcomes. In addition, multinational corporations are considered as central actors in global production networks that exert influence through their executives and, therefore, push for respective technological solutions worldwide. In this context, the paper uses then the upper echelon theory of Hambrick & Mason (2018), which states that rationalities are created through the characteristics of decision-makers. I then argue that these characteristics are developed within university degrees as described in Bloch et al. (2018) and through previous working experience as stated in Tyler & Steensma (1998) and Hambrick (2007).

For the analysis, the research is based on an instrumental case study of the water sector. I analyze the data by conducting a quantitative Social Network Analysis and descriptive statistics of the 20 biggest multinational water companies. The case study is used since it allows me to define boundaries of a specific sector while it also enables me to draw reliable information about the broader class (Flyvbjerg, 2006). The water sector is considered a good

example since it contains heavily centralized infrastructure characteristics and high affection to globalization processes (Fuenfschilling & Binz, 2018).

The results in this paper suggest that global regime rationalities diffuse within the education and prior work experience of decision-makers in global regime networks. Additionally, I suggest that global elite networks play a predominant role in this diffusion of knowledge between actors in global regimes. This argument is based on the fact that 17 out of 20 corporations are connected somehow to each other by universities and the educational background of their decision-makers. Furthermore, the results show that a major share (36%) of all executives have gained experience in sectors that follow similar development logic with strong regimes and highly capital intensive, centralized infrastructures. This might show that core regime logics are transferred via elite members between different infrastructure sectors and partly explain rationalities' diffusion. Furthermore, I find no evidence that interlocking directorates diffuse global regime rationalities. The network just contains two connections between four companies and therefore characterize an isolated network.

In terms of rationality creation, I argue that standards, routines, and similar institutional logic are developed by higher educational institutions (ed. Bloch et al., 2018). Descriptive results show that 50% of all decision-makers have received a degree in management, finance, or accounting. Putting this finding into the context of regime literature would lead to the assumption that global regimes become affected by rather economically efficient and unsustainable technologies (Fuenfschilling & Truffer, 2013). In addition, the results show that the Harvard Business School has the highest share of connections to MNCs, and most companies are connected through elite universities in the USA and the UK. The results here do not claim that rationalities purely develop within higher educational institutions. But using the water sector as a case study has allowed the research to identify mechanisms that explain how and why things happen and where rationalities in global infrastructure regimes might develop.

The thesis also helps to put the findings into the context of existing literature. Especially the Harvard Business School case studies approach has been widely accepted in business schools throughout the USA and the UK (Smith et al., 2002). Considering the findings above, I suggest that the case study approaches have influenced global elites through their educational degrees and therefore global regimes. Driven by traditional managerialism & capitalistic approaches (Contardo & Wensley, 2004), it may explain similar regime-rationalities with large and centralized infrastructures instead of locally and more favorable sustainable solutions.

All in all, I have contributed to the understanding of the stability of global regimes in infrastructure-heavy sectors. The paper has created a new conceptual perspective to understand why similar institutional logic evolves around the world. Further analysis should be done by analyzing more qualitative features that influence executives' educational and professional backgrounds. Also, the findings give policymakers first insights on how and where to best intervene in locked-in structures and allow for more radical innovation to flourish. Here, I suggest that possible policy intervention in terms of university curricula would give an initial possibility to step in. Lastly, the presented study of the water sector also

allows me to translate findings between sectors. It gives further research the possibility to adapt the conceptual perspective of global elites to different infrastructure-heavy sectors.

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Appendix A

Variables	Explanation
Name	Name of the individual in the dataset
Nationality	Nationality of the individual
Company	One of the 20 respective companies the individual is working for
Country	Country where the company is based in
Position	Contains information about the position the individual is currently pursuing
Gender	Gender
University	The university where the individual has obtained a higher education degree
Subject	Subject the individual has obtained his/her higher degree in
Town	Town where the university is based in
Country	Country where the university is based in
Work	Companies of previous work experience of the individual
Sector	Own created groups of sectors relating to variable " Work" where the individuals has worked in
Source	Source of the information

Sector	Explanation
Energy	Companies that just focus on the energy sector – mostly electricity provision in some form fossil fuels and renewables
Water & Energy	Energy companies that are specialized in the field of water provision and water related infrastructure
Water	Companies specialized in water provision or water-related infrastructure
Oil & Gas	Companies specialized in the extraction of Oil & Gas or energy provision by only Oil & Gas
Industry	Contains various industries which are not part of other groups, such as manufacturing tools, packaging, and wholesale
Steel & Aluminium	Steel, Iron & Aluminium heavy industries that are mainly focused on production
Automobile	Companies related to the Automotive sector
Finance	Companies related to the Finance sector such as Banks, Private Equity or Investment Firms
Consultancy	Consultancies who do not specialize in a specific sector instead rather provide general services such as Management consultancy (All other consultancies were included in the specific sector)
Research	Mostly research institutions, either private or public related
Education	University-related work such as a professor or board member
Waste management	Companies related to waste management, excluding wastewater treatment

Real Estate	Contains actors in the Real Estate sector, such as Real Estate Investment Firms, Hotel Chains, or similar
Health Care	Health-care-related service provider
Infrastructure	All Infrastructure related companies or service providers of infrastructures, excluding the water sector
Technology	Specifically, technology-related companies e.g, service provider for clouds, software, artificial intelligence
Airline	Airlines & Airports
Food & Retail	Food production and wholesale and Retail sector in general
Chemical	Chemical sector
Diverse	Non-specific sectors

Additional Notes for data collection:

The following bullet points explain extraordinary cases where no direct CFO or COO could be found:

- For Eranove, I included the Deputy CEO since Pascale Albert-Lebrun has a financial background and seems to hold as an Investment Manager.
- For Xylem, I took the Senior Vice president Mr. France Cerwinka as an COO since he holds the second most important position and is responsible for emerging markets.
- For Saur – EQT, I included Mr. Albin Jaquemont as a second CFO since I don't find any information regarding the COO.

Link for the dataset and matrices:

https://osf.io/aynbq/?view_only=d04982f2ed2d4230adab6c38f370bfd0

Appendix B

Data Tables for 5.1.3

Universities

University	Degree
Harvard University	6
University of Cambridge	3
Stanford University	3
Tsinghua University	3
University of Ottawa	2
University of Michigan	2
London Business School	2
IMD Business School	2
University of Hong Kong	2
University of Manchester	2
INSEAD France	2
National.University.of.Singapore	2
Ecole.Des.Hautes.Etudes.Commerciales.de.Paris	2
Ecole.Nationale.Des.Ponts.ET.Chausees	2
Ecole.Polytechnique	2
Paris.School.of.Business	2
University.of.Birmingham	1
University.of.Liverpool	1
Institut.d.études.politiques.de.Paris.	1
Harvard.Kennedy.School	1
University.of.Santo.Tomas	1
United.States.Naval.University	1
Darden.School.of.Business	1
School.of.Engineering.Sao.Paulo	1
Notheast.Forestry.University	1
Universidad.de.las.Americas	1
Xi.an.Jioatong.University	1
Southern.Illinois.University	1
North.Carolina.State.University	1
Colegio.Universitario.de.Estudios.Financieros	1
Durham.University	1
University.of.Nottingham	1
Emlyon.Business.School	1
University.of.Sao.Paulo	1
State.University.of.Campinas	1
Asian.Institute.of.Management	1
Ateneo.de.Manila.University	1
University.of.California	1
Occidental.College	1
Nanyang.Technological.University	1
Macquarie.University	1

China.Europe.International.Business.School	1
William.E..Simon.School.of.Business	1
Lafayette.College	1
The.Hong.Kong.Polytechnic.University	1
Institute.of.Chartered.Accountants.of.Pakistan	1
Queens.University.of.Charlotte	1
University.of.Malaga	1
Queen.Elizabeth.College	1
Bootham.School	1
University.of.Chicago	1
De.La.Salle.University	1
Madrid.Schhol.of.Architecture	1
University.of.Pittsburg	1
National.University.of.Defense.Technology	1
Oxford.University	1
University.of.Pennsylvania	1
U.S.Military.Academy	1
Security.Institute.of.Australia	1
University.of.Sydney	1
Saint.Louis.University	1
Korea.University	1
University.of.Hull	1
International.Institute.for.Management.Development.Geneva	1
Bergische.Universität.Wuppertal	1
Harvard.College	1
Tufts.University	1
Paris.Dauphine.University	1
Loyala.Marymount.University	1
University.of.Witwaterstrand	1
Mines.Paris.Tech	1
Guanghu.School.of.Management	1
Wuhan.University.of.Science...Technology	1
Texas.A...M.University	1
Universidad.Complutense.de.Madrid	1

Countries:

Country	Degree
USA	13
UK	9
France	5
China	3
Hong Kong	3
Spain	2
Switzerland	2
Singapore	2
Australia	2
Germany	1
Canada	1
New Zealand	1
Korea	1
Brazil	1
South Adfrica	1
Mexico	1
Pakistan	1