



Research & Innovation in the EU Bioeconomy Strategy

– A useful solution or a political buzzword?

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Abstract

Several policies and strategies for mitigating climate changes and for enhancing our way of handling natural resources have been developed during the last decade, where the EU Bioeconomy Strategy could be seen as one example. Research and innovation (R&I) is repeatedly used within policymaking as a tool for enabling transition into a more sustainable society and the EU Bioeconomy Strategy is no exemption. Scholars have earlier argued that R&I has turned into an uncontested concept and therefore used within policy to gain support and to bridge political disagreements. Analysing the EU Bioeconomy Strategy is important since EU policies are likely to influence other policies within the field. This thesis therefore aims to critically analyse how R&I is framed and considered in the EU Bioeconomy Strategy, what models and approaches the strategy promotes for enabling R&I-based solutions, as well as how the positive connotation of R&I in policymaking may have emerged. To do so, a critical discourse analysis in combination with a theoretical framework consisting of ecological modernization theory and the pro-innovation bias have been used. The results show that aspects such as difficulties to adapt to innovations, uneven distribution of innovations, positive effects from withdrawal of innovations and investments in already existing innovations are left out in the EU Bioeconomy Strategy. The analysis further shows that cross-sectoral cooperation and decentralized models are seen as essential for enabling R&I-based solutions and that the ecological modernization theory could be used as an explanation for why R&I has a significant role in the EU Bioeconomy Strategy. Considering that relatively few studies have examined the role of R&I in EU bioeconomy policies from a critical point of view, the importance of this thesis lays in the opportunity to provide insights on how future policies could be developed to adopt a more comprehensive attitude towards R&I.

Keywords: Research and Innovation, EU, Bioeconomy, Critical Discourse Analysis, the Pro-innovation Bias, Ecological Modernization Theory

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1. Introduction

During the past decades, several political incitements and policies for mitigating climate changes and decreasing the carbon footprint from human practices have seen the light of day. Strategies for supporting a transition to a so-called bioeconomy are one example. The definition of bioeconomy varies but a general understanding is to view bioeconomy as a way to combat climate changes by improving and scaling up the use of renewable resources to reduce society's dependence on fossil-based materials.

The European Commission developed a strategy for bioeconomy in 2012 which later was updated in 2018. Analysing the EU Bioeconomy Strategy is relevant since strategies carried out on a European level are likely to influence and set the agenda for national policies within the field. Several national strategies for bioeconomy have since the publication of the EU Bioeconomy Strategy been developed and more are likely to come. One of the motives with the EU Bioeconomy Strategy is precisely to deploy local bioeconomies across the EU. For instance, during 2021 and at the time of writing this thesis, a Swedish bioeconomy strategy is under development.

A specific trait in the EU Bioeconomy Strategy is the focus on research and innovation (R&I) as an enabler for a variety of objectives. The narrative of R&I is often presented as something positive, desirable and as an opportunity to make the transition into a resilient and climate-neutral society without compromising on current living standards. But what if there are flaws in this narrative? Earlier studies have shown that the concept of "innovation" almost exclusively is designated positive features. Skepticism to R&I is seen as old-fashioned or irrational and the potential negative impacts of research and innovation are rarely mentioned (Knight 1967; Holt 1971; Rogers 2003; Godin & Vinck 2017). Scholars have shown that the positive attitude towards R&I in policymaking can be interlinked with Ecological Modernization Theory, which in short is based on the ideas that innovation and new technologies will solve environmental issues connected to human practises (Mol & Sonnenfeld 2000; Leipold 2021).

This thesis emerges from the idea that R&I has turned into a discourse that maintains and strengthens the picture of R&I as something desirable and good. To get an overview of how the concept is pictured and valued in EU policy, this thesis will focus on how R&I is framed in the EU Bioeconomy Strategy. The interest in this kind of study lies in the opportunity to draw conclusions on how the manifested discourse of R&I in the EU Bioeconomy Strategy might influence other policies within the field. It also brings an opportunity to address aspects of R&I that often are omitted which in turn may contribute to a more comprehensive way of looking at R&I.

1.1 Aim & research questions

This study aims, from a critical point of view, to examine the role of R&I in the EU Bioeconomy Strategy and to analyse what may have influenced the emergence of the R&I discourse, using Ecological Modernization Theory. The study will also analyse how R&I, according to the strategy, is to be deployed and how responsibility for taking action on this is distributed. Another objective is to outline and discuss aspects of R&I which often are omitted, in order to contribute to a more holistic view of R&I.

The following research questions have been identified;

1. How is R&I framed in the EU Bioeconomy Strategy?
2. What models and approaches are supposed to be used for realizing and deploying R&I-based solutions within the EU Bioeconomy Strategy and who(s) is responsible for taking actions on this?
3. How could thoughts of Ecological Modernization Theory be used to explain the discourse of R&I and why R&I is used within policymaking such as the EU Bioeconomy Strategy?

Background

This chapter aims to give an overview of the concept of bioeconomy and to describe how ‘innovation’ could be defined. It will also describe how innovation is treated in policies and present a sample of earlier studies connected to the research in this thesis.

1.1. What is bioeconomy?

The concept of bioeconomy is becoming more widely used within society and several national and international strategies within the area are being developed today. Countries such as Finland, Austria, France, Germany, Ireland, Italy, Latvia, the Netherlands, Spain, Japan and the USA belong to them with dedicated bioeconomy strategies. The definition of bioeconomy is broad but a general understanding includes the use and processing of renewable and biological resources into products and services to decrease the dependency on fossil-based and non-renewable resources (Tillväxtanalys 2016). Businesses within the primary sector such as agriculture, forestry and fisheries, are playing a major role in the bioeconomy, as most of the bio-based materials and resources derive from these businesses (Nordiska Ministerrådet 2018). The bioeconomy is however not only attached to the use and processing of biological resources. In many strategies, the concept is treated as a comprehensive instrument with the potential to solve societal challenges. New jobs, rural development, enhanced biodiversity, food safety and plastic-free oceans are only a handful of the values attached to the bioeconomy. Moreover, the use of side-streams and bi-products from the production and processing of biological resources as well as services such as nature tourism are also included in the bioeconomy concept (European Commission 2018a, p.6; Tillväxtanalys 2016; Formas 2012). The wide spectrum of bioeconomy gets visible when looking at different definitions of the concept. The strategy developed by the European Commission has defined bioeconomy as follows:

The bioeconomy covers all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture, forestry,

fisheries and aquaculture); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services ((European Commission 2018a, p. 27).

The Organisation for Economic Cooperation and Development OECD, has a slightly different definition, with a larger emphasis on technological features:

A bioeconomy can be thought of as a world where biotechnology contributes to a significant share of economic output. The emerging bioeconomy is likely to involve three elements: the use of advanced knowledge of genes and complex cell processes to develop new processes and products, the use of renewable biomass and efficient bioprocesses to support sustainable production, and the integration of biotechnology knowledge and applications across sectors (OECD 2005).

The Swedish government research council Formas has in turn identified the bioeconomy as:

An economy that emerges from a sustainable production of biomass to increase the use of renewable resources in several areas within the society to decrease climate impacts and the use of fossil-based resources. The bioeconomy will as well bring added value for biomass and contribute to a more efficient and decreased use of energy and nutrients. This will further increase the value and contribution of ecosystem service to our economy (Formas 2012).

As visible above, there is no common or agreed definition of the bioeconomy. The definition is rather dependent on the wished-for outcome, which for instance could be connected to enterprise policy development, security- or environmental policy consideration (Tillväxtanalys 2016). The bioeconomy is in many cases linked to the concept of circular economy, which refers to effective use and recycling of materials in non-toxic flows to replace virgin materials (Formas 2012; European Commission 2018a). The focus also depends on the resources available in the country at issue. Finland, Sweden, Estonia and Latvia are traditionally oriented towards the forest-based sector while Denmark and Ireland are big in bio-based chemical, pharmaceuticals, plastic and rubber (European Commission 2018a, p.30). In 2017, bioeconomy-related activities in EU member states (EU-27) employed 17,5 million people which represent 8,9% of the total labour force. This brought a value-added up to EUR 614 billion, corresponding to 4,7% of GDP in the EU (European Commission 2018a).

The European Commission adopted the first strategy for bioeconomy called "Innovating for Sustainable Growth: A Bioeconomy for Europe" in 2012. The strategy is proposed as “a comprehensive approach to address the ecological, environmental, energy, food supply and natural resource challenges that Europe and indeed the world is facing today” (European Commission 2012, p.4). Later in

2018, a second updated and reviewed edition called “A sustainable Bioeconomy for Europe: strengthening the connection between economy, society and the environment” was published. This thesis will focus on 2018s strategy. The strategy’s five main objectives target a broad range of areas which is presented below:

- Ensure food and nutrition security
- Manage natural resources sustainably
- Reduce dependence on non-renewable, unsustainable resources
- Limit and adapt to climate change
- Strengthen European competitiveness and create jobs

The EU Bioeconomy Strategy has as earlier mentioned a strong focus on research and innovation as an essential for developing and enhancing a bio based-economy within the EU. The following section of this chapter will look into the concept of innovation in order to provide a more detailed understanding of what innovation is and how it could be defined.

1.2. What is innovation?

The concept of innovation is similar to the concept of bioeconomy, quite wide and is defined and applied differently. Everett M. Rogers (2003), sociologist and well-known researcher within the field of innovation theory, explains innovation as an idea, a practice or an object that is perceived as new by the adopter (Rogers 2003). The Swedish government writes that innovation is a new or enhanced solution that contributes to society, enterprises or/and individuals (Regeringskansliet n.d.). Innovations have during the last decade got increased attention in politics as well as in society in general due to its capacity to contribute with useful products, services and solutions (Formas 2018). A scholar who had a large impact on innovation theory was the Austrian political economist Joseph A. Schumpeter (1883-1950). He emphasized the commercial and novelty aspects and outlined five types of innovations (Schumpeter 1912 see Utredningen om innovativ verksamhet inom kommuner och landsting 2003):

- The introduction of new products (could also be products that already are existing but have not yet been commercialized) or a new quality among products
- The establishment of a new production method or a new way of handling a commodity

- The establishment of a new market, that is to say, a market to which the sector at issue have not been selling products before
- Access to new material or resources
- The reorganisation of a business or an organization

As visible above, Schumpeter's definition emphasizes that innovation is a practice or a product that is considered as new or unexplored. Rogers (2003), Goulet and Vinck (2017), argue on the other hand that innovation does not necessarily need to include new knowledge or a new technique. An innovation could for instance be the removal of existing innovation if the removal opens for a better solution to be adopted (Goulet & Vinck).

Further, Godin and Vinck (2017) argue that the concept of innovation is embedded in an economic ideology, as it often is promoted as a tool for growth and development both among policymakers and within the private sector (Hajer 1997; Mol & Sonnenfeld 2000; Godin & Vinck 2017; Leipold 2021). Before the twentieth century, innovation had nothing of its present positive spirit. Back then, innovation was rather connected to the indecent and undesirable word "revolution", which was used by opponents of change (Godin & Vinck 2017).

This has however changed and today everyone likes to be innovative. Organisations and businesses implement the concept as a natural goal in their strategic planning while governments legislate to make whole countries innovative (Godin & Vinck 2017). Godin and Vinck (2017) argue that this shift happened gradually when one started to recognize that the concept functions as a measure for political, social and material improvements in society. In the early 1900s century, a whole new vocabulary on innovations emerged where innovations, in contrast to revolution', were framed as something creative and as a tool for progressive change. The development of new technologies is seen as a key factor for this change. After World War II, governments who earlier contested innovation now saw technological innovations as a policy tool for much-needed economic growth and increased international competitiveness. Soon several innovation policies were launched and scholars followed. The concept of innovations hence became attached to technology *and* economic growth which enabled its commercialisation. A new political language was then developed, research and development led to innovations and innovations led to welfare. Economic policy and science policy merged to innovation policy. This evolution was encouraged by academics who created a large set of models to guide policies (the word 'model' itself later became an essential

concept in innovation research) as well as by the public sector who was the base for the development of new technologies or “innovations” (ibid).

Due to this history, innovation often gets connected to technological development within the private and industrial sector (Rogers 2003; Godin & Vinck 2017; Formas 2018). This perspective has however broadened, and innovations are now emphasized within the public sector as well and applied as a solution for social and organizational matters such as poverty, unemployment, migration, demographic challenges etc. The technological attachment does however remain (Godin & Vinck 2017), which for instance is visible in OECD’s definition of innovation:

An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations (OECD 2005).

The meaning of innovation is not clearly defined in the EU Bioeconomy Strategy, but looking at the European Commission's web-page, one can find texts which indicate that technology is given a prominent position in relation to innovations, but also that the concept has evolved to include social and organizational traits:

To accelerate the modernisation of the EU industry, the uptake of product and service innovations, use of innovative manufacturing technologies and the introduction of new business models is necessary. The Commission develops policies that help speed up the broad commercialisation of innovation and engages in many activities that support innovation in the EU (European Commission n.d. b)

Social innovations are new ideas that meet social needs, create social relationships, and form new collaborations (European Commission n.d. b)

Workplace innovation can be a change in business structure, HR management, relationships with clients and suppliers, or in the work environment itself (European Commission n.d. b).

Another important aspect to mention is the implicit assumption that research is the key driver for innovation and as such is often promoted as a crucial instrument for the development and diffusion of innovations (Godin & Vinck 2017; Kimberly 1981). The European Commission adds to this argument by writing that:

Much but not all innovation stems from research; not all research leads to innovation. Research needs time to generate results, while speed is essential for successful innovation. Even so, research and innovation need to be integrated as much as possible in policy and programs. Research is necessary, but not sufficient, to fuel innovation (European Commission 2017a).

Despite the fact that innovation could appear separate from research and the other way around, there are still connections between the two which the acronym ‘R&I’

illustrates. In this thesis, what is said in relation to R&I will be in focus, as this terminology is also used in the EU Bioeconomy Strategy. It should however be clear that there can be a distinction between ‘research’ and ‘innovation’.

1.3. The role of R&I in policy

As this thesis builds on the idea that R&I is an uncontested concept that often is used in policy to solve a variety of issues, it is crucial to give an overview of how R&I is framed in policy connected to the field of bioeconomy and sustainable development overall. Starting at a broad level, fostering innovation and enhancing research is crucial for reaching several of the Global Sustainability Goals in the Paris agreement. For goal 9 (Industry, innovation and infrastructure), investments in sustainable industries, research and smart technologies are highlighted as crucial conditions for enabling sustainable development. It is stated that innovations and technological progress are a way to find solutions to economic and environmental challenges, create new markets and jobs, enhance resource efficiency and equal distribution of resources (UNDP 2021). The potential of research and technical development is further highlighted in goal 2 (Zero hunger), goal 3 (Good health and well-being), goal 7 (Affordable and clean energy), goal 8 (Decent work and economic growth), goal 14 (Life below water) and goal 17 (Partnerships for the goals) (UNDP 2021).

R&I is equally important for the European Green Deal, the European Commission's flagship for reaching climate neutrality within the EU in 2050 (European Commission n.d. a). Here, research and innovation are seen as a tool for the modernisation of the EU's economy and society in order to reach a just and sustainable future. R&I plays an important role in the European Green Deal by accelerating and navigating necessary transitions, by deploying, demonstrating and for de-risk solutions and engaging citizens in social innovations (European Commission n.d. c). Further, large investments in R&I under the Green Deal have been made available. In 2020, the European Commission designated €1 billion to the EU's research and innovation program Horizon Europe. The program is supposed to mobilise R&I, catalyse actions, deliver impact and demonstrate solutions for European public goods as well as enable new partnerships for research and innovation within the EU (European Commission n.d. d).

Looking at Finland which has a long tradition within bioeconomy-related businesses, it seems like R&I is promoted in policymaking here as well. A national strategy for bioeconomy was developed in 2014. Here, possibilities to develop new businesses from bioeconomy products and services, new production technologies

and biomaterials and new models for clean technologies (cleantech) are emphasised (Finska arbets- och näringsministeriet 2014). Looking at the strategic goals in the Finnish strategy, one finds that the creation of new businesses and bold experiments are included, which could be interpreted as promotion of innovations (cf. Schumpeter 1912 see Utredningen om innovativ verksamhet inom kommuner och landsting 2003). Another goal is to strengthen the competence-base within bioeconomy whereas increased research is deemed as essential (Finska arbets- och näringsministeriet 2014). The hypothesis about EU policy to impact national policy is strengthened by the fact that the EU's role is highlighted in the Finnish bioeconomy strategy, which furthermore aims to support EU objectives.

Similar traits are found in the Swedish strategy for circular economy. The strategy which aims to limit climate impacts by increasing resource efficiency, emphasizes that innovations have a crucial role in creating new business models where resources are recycled to a greater extent. It is also stated that innovations can create new jobs and technologies which in turn will strengthen Sweden's competitiveness globally (Regeringskansliet 2020, p.13). The relation to the EU and the importance to develop goals in line with EU objectives are similar to the Finnish bioeconomy strategy, highlighted as an important aspect (Regeringskansliet 2020, p. 12).

1.4. Literature review

In this thesis, some of the literature has been especially important for fulfilling the aim and research questions. The anthology *Critical Studies of Innovation – Alternative Approaches to the Pro-innovation Bias* by Benoît Godin and Dominique Vinck (2017), has been an important source for critically analysing the means of R&I in the EU Bioeconomy Strategy. Godin and Vinck (2017) presents several aspects of innovation that usually are left out, such as collateral impacts of innovations, withdrawal of innovation and the rationale of not innovating. Their work has additionally been crucial for being able to discuss potential impacts of promoting R&I-based solutions in the EU Bioeconomy Strategy.

In the article *Transforming ecological modernization 'from within' or perpetuating it? The circular economy as EU environmental policy narrative*, Leipold (2021) investigates the EU policy narrative of circular economy. The study shows that a discourse of ecological modernization theory is visible within EU policy for circular economy and that the discourse at issue has gotten a larger hold of EU policy during the last decades. Leipold's findings have contributed to this thesis as the ecological modernization theory likewise will be used to theorize and explain why R&I has gotten a prominent role in policy. Additionally, many of the findings

presented in Leipold's article has contributed with important insights to my research as the circular economy is closely linked to the bioeconomy.

The literature on Ecological Modernization Theory provided by Mol & Sonnenfeld (2000), Hajer (1997), Huber (2008) and Buttel (2000) have further been essential to understand and connected the theory to R&I. The literature has also provided a historical background of the political evolvement since the 1960s which have been important in order to better understand the political climate today as well as to draw conclusions on why R&I has a prominent role in the EU Bioeconomy Strategy.

To date, only a handful of studies have critically examined R&I in relation to bioeconomy. In the article *Measuring innovation in the bioeconomy – Conceptual discussion and empirical experiences*, Wydra (2020) highlights that it is unclear to what extent innovation activities manage to deliver on desired positive impacts to societal goals. While this thesis seeks to problematize the promotion of R&I in EU policy and to highlight its discursive characteristics, Wydra's research deems that the uncertainties of R&I are due to the lack of measurements and indicator systems for monitoring the socio-economic outcomes of R&I-based solutions.

In the paper *Pros and cons of the bioeconomy: a critical appraisal of public claims through Critical Discourse Analysis*, Sodano (2013) argues that there seems to be a techno-neoliberal ideology imbued within EU bioeconomy policy and that the emphasis on the bioeconomy to bring social benefits is far from relying on sound scientific arguments. Similar to Sodano, this thesis argues that EU bioeconomy policy is influenced by political ideology, since R&I is highlighted as a cornerstone for solving a plethora of issues in the strategy. Sodano's study is, however, aiming to question whether the promotion of bioeconomy itself might pose risks that are concealed in EU policy, while this study is aiming to analyse and question the promotion of R&I. Further, Sodano's study did not analyse the EU Bioeconomy Strategy, but an EU policy document from 2011 called "The European Bioeconomy in 2030, a White Paper".

By examining how R&I is framed in the EU Bioeconomy Strategy, this thesis provides an important opportunity to advance the understanding of how the R&I discourse has merged and how it may affect future policies within the field. This study also aims to provide new insights on aspects with R&I which mostly is left out and contribute with a critical analysis on the models for deploying R&I-based solutions promoted in the EU Bioeconomy Strategy.

2. Theory

This chapter aims to explain the ecological modernization theory and the pro-innovation bias which constitute the theoretical framework in this thesis.

2.1. Ecological Modernization Theory

The Ecological Modernization Theory (hereafter abbreviated to EMT), emerged in the early 1980s within a small group of sociological scientists such as Martin Jänicke, Volker von Prittwitz, Klaus Zimmermann, Marten Hajer et.al. It is however the German sociologist Joseph Huber who is considered the theory's original founder (Mol & Sonnenfeld 2000). A basic idea in EMT is that economic growth and environmental improvements could be combined through the re-adaptation of society. This includes increased resource- and energy efficiency, development of new and innovative techniques for sustainable processing and consumption, clean technologies, removal of fossil- and hazardous substances as well as enhanced production and industrial schemes. Innovations and technical solutions are hence seen as key drivers for EMT. By upgrading and innovating the way of using and handling natural resources, it becomes possible to enhance resource efficiency and to cut turnover losses at the same time as emissions could be reduced and environmental resilience could be enhanced (Mol & Sonnenfeld 2000). The theory could be traced back to a set of societal changes starting with the emerging environmentalism in the late 1960s where concerns over environmental changes started to take a larger part in the public debate. The economic recession in the late 1970s did however tone down the debate of environmental issues in the face of economic slowdown and mass unemployment. This led to a change in the environmental discourse, whereas environmentalists had to find arguments for connecting environmental protection with positive development of society (Hajer 1997). EMT introduced a new political approach that made it possible to combine environmental policy with growth- and welfare policy. This approach soon became popular within environmental policy as it enabled politicians to please a larger public (see Huber 2008; Mol & Sonnenfeld 2000; Hajer 1997). R&I became central for bridging these visions and was soon applied as a solution for a variety of problems within a wide range of areas. Another important factor that contributed to

the emergence of EMT was the fact that academics opened up for altering the political discourse when ideas of EMT started to gain a foothold among scholars. From there on several academics provided an alternative language with concrete solutions on how environmental problems could be solved. For example, experiments on energy savings concluded that environmental solutions indeed could be combined with a greater economic return. EMT thus provided a more direct and conceptualized thinking of environmental improvements by addressing the role of innovations and technology as a solution. To conclude, the emergence of EMT could be explained as a combination of social, economic and scientific changes in society (Hajer 1997; Buttel 2000). The first academic contributions on EMT had a large focus on technological innovations as the solution for environmental policy and reforms, especially those by Joseph Huber (Mol & Sonnenfeld 2000). The content of EMT have broadened and evolved since then, but the theory still gather three broad perspectives (Mol & Sonnenfeld 2000; Ali 2013):

- Environmental problems are no longer seen as a ‘curse’ for our way of living and handling natural resources but as a challenge for social, technical and economic innovations
- Emphasizing collective and innovative transformation of core social practises and institutions such as consumption, production, politics and governance in order to reach sustainable development
- Economic growth and modernization could be reached at the same time as resolving environmental and ecological problems

Innovations and especially technical innovation is a key component in EMT. Huber (2008) argues that this focus simply reflects the fact that innovations and technological practices to some extent always are intertwined in the production, extraction and consumption of natural resources. This given, development of innovations and technology that change operative structures have the potential to relieve pressure on resources and nature. A key thought within EMT is that innovations and technology provide solutions for handling environmental problems at the same time as they entail a potential to enhance and strengthen nature and ecosystem services (Mol & Sonnenfeld 2000; Huber 2008). EMT is thus seen as a positive-sum game approach. New technologies and innovations will lead to both economic growth and to a better ecological environment (Hajer 1997). Looking at the first contributions on EMT and especially the work by Huber (cf. 2008), one could see that the theory is characterised by governmental distancing and instead emphasizes the role of market actors as an important source for developing new techniques and innovations and for taking a front lead in the environmental reform.

(Mol & Sonnenfeld 2000). Scholars have criticized thoughts of ecological modernization theory for being all too optimistic about the possibilities to combine economic expansion and ecological sustainability. EMT is also criticized for implying a dominant economical and socio-central approach which legitimizes resource-intensive living practices (de Man & Friege 2016; Hobson & Lynch 2016; Skene 2018).

It has earlier been noted that an ecological modernization discourse is dominant in EU policy. A study focusing on the EU's policy narrative on the circular economy (the EU Bioeconomy Strategy is interlinked to circular economy cf. European Commission 2018a; European Commission et al. 2018b) shows that despite many shifting views on sustainable development and environmental policymaking among EU institutions and member states, the ecological modernization discourse seems like a point where consensus can be reached (Leipold 2021). The emergence of EMT in EU policymaking can be explained by the fact that the EU's political position took another turn due to economic aspects such as the global economic crisis in 2008. The urgent need for economic growth in the EU and the world overall had a clear impact on environmental policy. According to the interviews in Leipold's study, it is clear that the EU's environmental policymaking changed into an agenda where actions on climate change also linked to economic growth (Leipold 2021).

The EMT constitutes an important piece of the jigsaw for the third research question, as the theory provides an explanation to why R&I has come to take a larger part in policymaking during the last decades. The perspectives presented above will be used as a framework to explain the role of R&I in policy and the technological focus on innovation. It should however be mentioned that other theories and frameworks besides EMT potentially could be used to explain the R&I discourse found in the EU Bioeconomy Strategy, such as Post-Fordism (cf. Amin 1994) or Technocapitalism (cf. Suarez-Villa 2001). EMT should therefore not be seen as the sole explanation to why R&I has come to take a large place within the EU Bioeconomy Strategy, but rather as one of several explanations to the emphasis on R&I.

2.2. The Pro-innovation Bias

As previously shown, R&I has been used and highlighted as a solution in policy since the beginning of the 1900 century and a common perception is to look at innovations as something desirable and good and as a tool for progressive change. Godin and Vinck (2017) argue that studies on innovation have become an industry

as innovations nowadays could be applied within almost every discipline. Despite the number of studies and orientations on innovation, they all seem to have one thing in common - innovations are good, always good (Godin & Vinck 2017).

Several researchers before Godin and Vinck have issued this statement. One of them is (Rogers 2003). In the early 1960s, Rogers expressed that researchers have taken for granted that the adaptation of innovations is a desirable and rational behaviour whereas the rejection of innovations is less desirable (and irrational). Rogers called this '*the pro-innovation bias*' (Rogers 2003).

Rogers (2003) describes the pro-innovation bias as the assumptions that research and innovations are exclusively positive, that innovations should be adopted by all members in a social system and spread rapidly. Innovations should by no means be rejected nor re-invented. The pro-innovation bias is rarely explicitly expressed but rather implied in different ways, for instance by the fact that potential negative effects of innovation rarely are mentioned. Rogers argues that the pro-innovation bias is one of the most prevalent shortcomings in innovation research as it might lead to the ignorance of uneven distributions of innovations, to overlook existing practises and troubles with adaptation to innovations. Hence, the pro-innovation could be seen as a failure to consider aspects that are of uttermost importance for successful diffusion of innovations (Rogers 2003).

Knight (1967) contributed to the idea of the pro-innovation bias when he later in the 1960s shone light on the value judgments attached to the term innovation. Knight argued that innovations often are described as something mysterious, attractive and as something which carries great potential (Knight 1967). Also, Holt (1971) strengthen these thoughts, arguing that:

One of the vogue words these days is innovation. For some people it is even more - it is a value word that implies something good and positive (Holt 1971, p. 235).

Godin and Vinck (2017) argue that the establishment of the pro-innovation bias could be seen as a discourse that emerged in parallel with the increased focus on innovation in policy making. Similar to Rogers (2003), Godin and Vinck (2017) argue that pro-innovation bias can inflict damage if innovations simply are applied as a solution to all kinds of problems without considering potential side effects or issues with the deployment of innovations. By using the pro-innovation bias, it becomes possible to challenge the perspective of innovations as a common good and to highlighting what most scholars on innovation theory and politics have left out, such as resistance to innovation, innovation failures, unexpected outcomes from innovations, maintenance of (existing) innovations, adaptation of innovations, the social and political nature of innovations and so on.

In accordance with the above, the pro-innovation bias will be used to analyse, explain and challenge existing ideas about research and innovation in the EU Bioeconomy Strategy as well as to highlight those aspects of innovation that have been left out. While the perspectives provided by EMT are used as a tool for explaining the emergence and popularity of R&I in policy, the pro-innovation bias helps me to critically analyse the usage of R&I in policy as well as to highlight aspects of R&I which have been left out in the strategy. The pro-innovation bias and EMT therefore constitute as important supplements to each other in the theoretical framework of this thesis.

3. Method

This chapter aims to explain the critical discourse analysis, central concepts and Fairclough's three-dimensional model which will be used as the methodological framework in this thesis.

3.1. Critical Discourse Analysis

In order to analyse how research and innovation are framed in the EU Bioeconomy Strategy, a critical discourse analysis will be used as a method in this thesis. A discourse can be understood as the way of how we talk, understand and orientate ourselves in the physical and social world. It is a way of creating certainty and direction for communication as well as for action. Analysis of language and texts is therefore central in discourse analysis (Bryman 2012). Discourses appear in various forms and could be found in many social structures. It could for example be a medical discourse, a political discourse or as in the case of this thesis - a discourse of research and innovation. Discourses can be manifested in actions and the inclusion of R&I in political strategies could be seen as an example (cf. Winther Jørgensen & Phillips 2000).

Discourse analysis is a multidisciplinary approach that is used for many types of research problems. There are also different directions and approaches within discourse analysis. *Critical discourse analysis* is a collection of methods and theories which are used to address and examine the relations between discourse and its effects on physical, social and cultural practices. The analysis is critical in the sense of wanting to clarify the way discourses shape and retain our social reality, relations and also power structures (Winther Jørgensen & Phillips 2000). A central part of the critical discourse analysis is hence to identify the connections between language and social practice. The focus should be on how the discourse contributes to the maintenance and change of the social order (Winther Jørgensen & Phillips 2000). This paper will primarily rely on Norman Fairclough's understanding of critical discourse analysis. Fairclough is defining discourses "as a way of speaking which gives meaning to experiences by a certain perspective". A discourse is hence something that could be separated from other discourses such as an environmental

discourse, a feminist discourse etc. (Winther Jørgensen & Phillips 2000). According to Fairclough's perspective, critical discourse analysis is seen both as a method and as a wider theoretical approach within discourse analysis. In contrast to other thinkers within the field, Fairclough argues that discourses, that is to say, our language and understanding of reality, does not only contribute to the formation and creation of social practices. Instead, social structures such as politics, governance and the development of society are manifested in discourses (Winther Jørgensen & Phillips 2000). A few of the most prominent points which summarize his understanding of the method are:

- Discourses contribute to the constitution of our lived reality. That is to say, the way we talk and write and the way we read and perceive texts is a crucial social practice that shapes our understanding of the world
- Discourses are also a constitution of social practises such as culture, political, institutional practises and power relations
- Critical discourse analysis includes concrete analysis and interpretation of texts or language
- Discursive practises are seen as a way to create and reproduce uneven power relations between groups. The analysis is critical in the sense of wanting to clarify these relations to pave way for change

By using a critical perspective, I seek to find structures and patterns on how R&I connects to other discourses and how it affects and maintains certain actions, such as the inclusion of R&I in political strategies. The critical discourse perspective also offers opportunities to question and challenge these structures which to a further extent is important in order to open up for constructive changes in language and practises connected to R&I. It should be remarked that the interest of this study is not to judge whether the R&I discourse which is presented in the strategy is "right" or "wrong". Instead, the aim is to analyse how R&I is framed in the EU Bioeconomy Strategy and to find explanations to how this discourse may have emerged, using a theoretical framework based on ecological modernization theory and the pro-innovation bias.

A trait of the discursive field is the critical position to self-evident knowledge. From a discursive perspective, knowledge should not instantly be considered as objective truth but as a result of how we categorize knowledge and reality. Hence, our knowledge is rather a reflection of our worldview than something definite (Winther Jørgensen & Phillips 2000). According to Winther Jørgensen & Phillips (2000), the

dilemma of discourse theory is that evidence and statements always will be embedded in discursive constructions and the analyst could therefore never claim to be a neutral actor. The following analysis will thus be a result of my own worldviews and understanding of R&I and the result presented in this thesis should therefore not be considered as an “absolute truth”. This is however not the purpose of this study. I will instead use the discursive framework to identify and challenge current discourses of R&I which in a further extent might contribute to new perspectives on R&I (cf. Winther Jørgensen & Phillips 2000).

3.2. Central concepts and analytic tools

Fairclough argues that all communication builds on previous communications and text production, he describes this as *intertextuality*. When language is directly interlinked and built upon earlier communication such as texts which refer to other texts, this is called *manifested intertextuality*. Analysis of intertextuality provides tools for analysing how text and language either maintain or change discourses (Winther Jørgensen & Phillips, 2000).

Another characteristic of Fairclough’s approach is his way of examining changes of discourses, the so-called *interdiscursivity*. Interdiscursivity is a form of intertextuality and occurs when new forms of articulation are introduced by merging traces from different discourses together. This is important in order to draw conclusions on how discursive practices are interlinked with changes in society as discursive change could be seen as a result of changing paradigms (Winther Jørgensen & Phillips, 2000). The latter will be a crucial theoretical standpoint in this study as I seek to understand how the view on R&I has emerged.

Modality is a measure of how the author uses expressions and transposing values in the text. It could for example be how much affinity (assent) the author puts in an expression, such as in the illustrated example: “R&I will/ has potential to/ might lead to increased working opportunities within bioeconomy”. “Will” indicates a strong affinity while “has potential to” and “might” indicates less affinity. Analysis of this kind of terminology is important as it affects the discursive practice, that is to say how discourses are perceived and further distributed (Winther Jørgensen & Phillips 2000).

Transitivity focuses on how subjects and objects are connected to actions in a text. An example of transitivity is the use of passive forms such as “R&I need to be better incorporated in the extraction of biomasses”. This phrase has left the agent out as it does not indicate *who* is responsible or in charge for the incorporation of R&I. *Nominalisation* is another word that describes how *agency* is watered-down in

communication (Winther Jørgensen & Phillips 2000). Nominalisation and transitivity constitute important analytic tools as the concepts will help me to identify things such as who holds responsible for the implementation and development of R&I - are there any key actors?

Hegemony is a way to critically analyse what is considered as “natural” or “right” within a certain area. Hegemony is a concept for challenging structures that we perceive as rational or normal. The concept draws attention to power structures and how these structures benefit from our perceptions of reality. Hegemonies are interlinked with ideology which makes them hard to change. Using the concept makes it possible to understand how our perception of what is right and normal has been legitimized. This concept could for instance be used to address how R&I has become “normalized” and how the framing of R&I as a political tool for implying changes might lead to the maintenance of uneven power structures (Winther Jørgensen & Phillips 2000).

3.3. Fairclough’s three-dimensional model

Fairclough’s three-dimensional model for discourse analysis offers a practical and concrete framework on how to conduct a critical discourse analysis. This model assumes that all produced language and texts are communicative action which could be analysed from: a) the characteristics and structure of a text, b) the processes of production and consumption of the text (Fairclough call this discursive practice) and c) the wider social practise in which the text is part of.

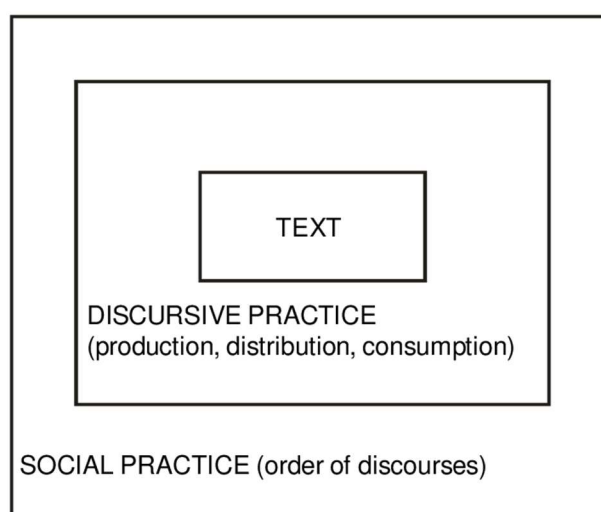


Figure 1: Fairclough’s three-dimensional model (Fairclough 2013).

The first dimension (central box) covers a systematic analysis of the text whereas linguistic characteristics such as grammar, vocabulary sentence structure, symbols, metaphors, synonyms etc. are in focus. By analysing these structures, it becomes possible to illustrate how discourses are practically created and maintained in texts (Winther Jørgensen & Phillips 2000). The text has to be thoroughly reviewed and analysed on sentence structures and word use. The analysis needs also to cover how text is designed (such as the tonality of the text) and how it connects to the ongoing discourse. Fairclough does however criticize some approaches which focus on linguistic analysis of text as he argues that such analyses do not fully consider the connection between language and society. The two following dimensions of his model are therefore essential to make an interdisciplinary analysis on how practical text compositions are connected to and represented in society and in our social and cultural perceptions of reality (ibid).

The second dimension of the model (middle box) illustrates an analysis of the discursive practice. Fairclough identifies the discursive practice as production and consumption of text. Analysis of discursive practice builds on the idea that the author(s) of a text uses already existing discourses (intertextuality) and genres to produce a text which the receiver (or consumer) perceives by using its own perspectives and knowledge about the presented discourses. Winther Jørgensen and Phillips (2000) mention news as an example in which discursive practises could be found. News reporting about local politicians builds on a local discourse which means that the receivers will perceive the given information differently depending on how familiar he or she is with local discourse and context (Winther Jørgensen & Phillips 2000). Summarized, during the analysis of discursive practices the analyst needs to consider both the production and consumption practises of the text. Central questions to ask are hence who has produced the text and who is the recipient? And which other discourses are the presented discourse part of?

The third dimension (the outer box) puts the other dimensions of the model in relation to each other and brings the analysis to a higher level by analysing how the discourse affects and interlinks with a larger *social practice*. As earlier described, discourses are both shaping and shaped by social practices. Discourses could hence be described as a maintainer of social practises and structures but also as a reflection of these structures and practices. By analysing the relation between discursive practice and social practise, it becomes possible to draw conclusions on ideological beliefs and changes in society. Questions to be reflected on within this dimension are if the discourse contributes to replication of the discursive order (within the specific genre) or could traces of discursive change be found? What ideological, political and social consequences are brought by the discourse? Is it enforcing any specific social structures of power relations? The third dimension in Fairclough's

model is hence aiming to analyse how the discourse at issue has been affected by social contexts such as economics or political structures. This implies a need for external theories. The analytic framework is therefore complemented by the earlier presented ecological modernization theory and the pro-innovation bias.

4. Results

The first sub-chapter, 4.1, aims to analyse how R&I is framed in the EU Bioeconomy Strategy and to answer the first research question, using the first and second dimensions in Fairclough's model. Sub-chapter 4.2 aims to answer the second research question by investigating what models and approaches that are supposed to be used for realizing the deployment of R&I-based solution. This sub-chapter is also based on the first and second dimensions in Fairclough's model. The results in 4.3 aim to answer the third research question as it explains how the R&I discourse can be connected to thoughts of EMT and hence to a larger social practice, by using the third dimension in Fairclough's model.

4.1. R&I – a panacea for societal challenges

The analysis shows that R&I has a prominent role throughout the strategy. It is applied as a solution to various challenges such as reducing food waste, exchanging fossil-based material and energy, mitigate climate changes and as a way to create new jobs. The analysis presented below and in the following chapters find that the strategy includes traits of a pro-innovation bias, as R&I generally is seen as a tool with great possibilities to solve a variety of challenges, such as accelerating the transition into a bio-based economy:

Realising [the bioeconomy's] potential will not happen on its own. It requires investments, innovation, developing strategies and implementing systemic changes that cut across different sectors (agriculture, forestry, fisheries, aquaculture, food, biobased industry). It means enhancing our capacity to translate opportunities from all types of innovation into new products and services on the market, creating new jobs locally. And it means doing it the European way: being economically viable with sustainability and circularity in the driver's seat (European Commission 2018a, p.7).

Using the conceptual framework provided by Fairclough, it becomes obvious that R&I is crucial for deploying a successful bioeconomy. R&I will for instance contribute with new and sustainable products as well as enhance the capacity to exchange fossil-based material with renewable resources:

Research and innovation and the deployment of innovative solutions for the production of new and sustainable bio-based products (such as bio-chemicals, bio-fuels, etc.) will also enhance our capacity to substitute fossil raw materials in very significant parts of European industry (e.g. construction, packaging, textiles, chemicals, cosmetics, pharma ingredients, consumer goods) (European Commission 2018a p.6).

As indicated above, R&I will contribute to a variety of production areas and enable a shift for industries to apply more sustainable practises. Words and phrases such as “will enhance” and “in very significant parts” indicate high modality, it is clear that R&I is strongly promoted as a valid solution. The text is, however, formulated in passive form. It does not reveal anything about how “innovative solutions” will be deployed, neither who is in charge of this. Agency is left out and traits of transitivity are therefore attached to the strategy (cf. Winther Jørgensen & Phillips 2000).

The analysis shows that R&I is viewed as a solution for all five main objectives in the strategy. The first objective, ensuring food and nutrition security, includes various measures such as changing consumption practices and nutrition, changing unsustainable biomass use, enhancing waste management and decreasing environmental impacts from food production. As is visible in the quote below, R&I is seen as an essential tool for resolving several parts of this objective:

Research and Innovation investments by public and private actors are supporting the shift from a conventional consumption and mass production model to food system supporting sustainable food and nutrition security for all. For the agri-food system, this includes giving increased emphasis on principles of agroecology and the support to farming systems that make efficient use of ecosystem services (e.g. organic farming, mixed farming, agroforestry) (European Commission 2018a, p. 48).

As R&I will lead to a “shift from a conventional and mass production model” to a “food system supporting sustainable food and nutrition security for all”, this indicates that current models are seen as unsustainable and irrational and that R&I is seen as a solution to this. Focusing on concrete textual characteristics, the word “model” could be interpreted to carry innovation-prioritized thinking, as the word is linked to innovation research (see sub-chapter 1.2, pp. 12-13). Also, a connotation of economic growth is visible in the citation above. Even though ecological principles are emphasized, these principles are mainly presented as an enabler for “efficient use” of ecosystem service. To stress efficiency indicates that enhancing ecosystem service is not the only objective, but also to detach as much as possible from these.

Regarding food production and farming systems, which accounts for around three quarters of the overall bioeconomy employment and about two-thirds of

bioeconomy turnover (European Commission 2018a, p. 8), the European Commission sees large scope for improvements:

Food and farming systems are a fundamental part of the bioeconomy, but they urgently need to be transformed to become more sustainable, nutrition-sensitive, resilient and inclusive in view of a growing world population, climate change and other environmental challenges, including water scarcity and loss of biodiversity and of productive land (European Commission 2018a, p.26).

Using words such as “urgent” and “transformation” indicates that current food and farming systems are not favourable and potentially even deemed as harmful. Using the formulation “food and farming systems” does not necessarily define the actor(s) involved in and responsible for the transformation. Is it national authorities? The food production industries? Consumers or, maybe, the food producers themselves? Further, the formulation does not reveal how far through the food production chain it stretches; does “food and farming systems” refer to food production and consumption only or does it also include a cradle-to-grave perspective including external impacts from aspects such as transports, storage and waste? To conclude, the broad and vague definition above risks creating problems for identifying and targeting all areas and actors involved in the food-production chain, which will be necessary for enabling the desired transformation.

R&I is further highlighted as a solution for enhancing consumption patterns:

It [research and innovation] also calls for a more personalised and customised food consumption model, while simultaneously improving sustainability, safety, resilience and resource efficiency of food production on land and sea. These investments drive solutions in the area of personalised nutrition, smart packaging, precision agriculture or smart local food systems to name just a few. At the same time, actors within the food system increasingly acknowledge that they need to engage more with citizens to design new solutions and to rebuild trust in the food systems (European Commission 2018a, p.48).

The suggestion that research and innovations will enable us to personalize our food consumption could be seen as an attempt to pick up on emerging trends of ‘self-tracking’ and ‘mobile health’ which briefly described refers to the use of technological devices to monitor and measure needs such as sleep, calorie intake and exercise. Using words such as “personalized”, “smart” and “precision” also indicates a technological focus as these words often are used in connection to technological development and as a way to emphasize technology's potential for enhancing finely crafted practises (European Commission 2009; Lupton 2016). A potential explanation to why the European Commission picks up on trends such as self-tracking and mobile health could be due to the political incentives of wanting to emphasize that the strategy is innovative and ‘avant-garde’. This reasoning gets

support from the study by Leipold, where an EU official during an interview argues for the importance to include positive and future-oriented visions in policy-making, as this lifts the policy's attractiveness and potential to gain political support (Leipold 2021).

Additionally, innovations will help us to reduce food waste and open for new value chains by (safely) turning waste into feed:

A sustainable bioeconomy is the renewable segment of the circular economy. It can turn bio-waste, residues and discards into valuable resources and can create the innovations and incentives to help retailers and consumers cut food waste by 50% by 2030. For example, in the livestock sector innovations increasingly allow to safely turning certain food waste into feed for animals, provided the applicable rules and legal requirements are observed (European Commission 2018a, p.6).

The quote shows that innovations are certainly having a clear position within the bioeconomy as innovations are not solely a tool for realizing various goals but also a direct effect of the bioeconomy. The way innovations are intertwined with the development of bioeconomy indicates interdiscursivity (cf. Fairclough in Winther Jørgensen 2000), that is to say, innovations are mentioned in the context of sustainable development and are thereby attributed positive features.

The second objective, managing natural resources sustainably, calls for improved use of natural resources, decreased biodiversity loss and degradation of ecosystem services as well as mitigating climate changes through the deployment of carbon sinks (European Commission 2018a, p.9). Here, research and data collection seem to be a key solution:

It is therefore necessary to have at any time the required data, information, and knowledge to judge if the observed developments are in the right direction [...] Commission's Knowledge Centre for Bioeconomy coordinated by the Joint Research Centre [...] develops and makes available forward-looking tools and results of foresight exercises. (European Commission 2018a, p. 89)

Research is hence important for enforcing a shift to sustainable natural resource management but also a way to forecast new trends and scenarios within the bioeconomy. This implies traits of the pro-innovation bias as the potential of new and future-oriented practices are recognised (cf. Godin & Vinck 2017). As argued by Kimberly (1981) and Godin & Vinck (2017) research is fundamental for the development of innovation. The citation “to develop and make available forward-looking tools and results of foresight exercises” could be interpreted as an implicit way of emphasizing a need for research which to a further extent is important for the development of innovations.

The third objective, reducing dependence on non-renewable, unsustainable resources, is seen as an essential task for the EU Bioeconomy. To increase the production of bio-based products and to make more efficient use of biomasses such as bio-waste, innovations are pointed out as crucial:

A stronger bio-based sector can accelerate the substitution of non-renewable resources in line with the EU's commitments under the Paris Agreement. Moreover, industrial symbiosis and innovative industrial bio-based processes contribute to the greening of industries and development of circular bioeconomies and products, for instance by innovating the way cities add value to their significant share of bio-waste (European Commission 2018a, p. 9).

Traits of interdiscursivity are once again found, for example by the way “innovative” get connected to “bio-based” and “greening”. Both these words can be seen as positively charged words from an ecological sustainability perspective, which might affect the reader's perception of ‘innovative’ (innovations) in a positive direction which in a further extent, contributes to enforcing the pro-innovation bias. The R&I discourse is here also consolidated by using manifested intertextuality as the authors refer “a stronger bio-based sector” (the bioeconomy) to EU's commitments under the Paris agreement. This is an additional example of what Fairclough (cf. Winther Jørgensen & Phillips 2000) calls for discursive practise, that is, when existing discourses and genres are used to produce text which in turn affects how the receiver perceives the presented material.

In relation to the fourth objective, mitigating and adapting to climate change, R&I is seen to have a crucial role as it will lead to increased possibilities for nature to adapt and regulate climate changes through the deployment of new practices in the primary production, such as carbon farming innovations:

Furthermore, a sustainable bioeconomy has large potential to reduce greenhouse gases emissions by promoting more resource efficient, active and sustainable primary production practices on land and sea, as well as by enhancing the capacity of ecosystems to regulate climate, for instance through the deployment of carbon farming innovations (European Commission 2018a, pp. 9-10).

The paragraph above indicates high modality as the bioeconomy is seen to have “large potential” for decreasing climate impacts. Even though carbon farming innovations are highlighted as a solution, the text is not mentioning what kind of innovations or by whom innovations should be developed and implemented. This is another example of nominalisation, so to say how agency is watered down (cf. Winther Jørgensen & Phillips, 2000).

The fifth and last objective is to strengthen European competitiveness and to create jobs. Here, innovations are seen as key drivers for deploying new markets and working opportunities within the bioeconomy sector:

The fifth objective, strengthening European competitiveness and creating jobs, is a core policy objective of the bioeconomy. Providing frameworks for developing and deploying innovations and fostering the development of markets for bio-based products [...] will support the global competitiveness and transformation of European industries. [...] it (the bioeconomy) has the potential to provide an important source of income diversification for farmers, foresters and fishermen, and to boost local rural economies through increased investment in skills, knowledge, innovation and new business models [...] (European Commission 2018a, p. 10).

As indicated, promoting bioeconomy across Europe will bring new, green and sustainable jobs and create opportunities for economic growth and rural development. Studies have in contrary to this, argued that a sort of ‘plateau’ has been reached, as innovation and new technology today is not driving economic growth to the same extent as innovations did back in the days, speaking of for instance innovations like the electricity, petrochemicals, and the telephone (Leitner 2017). Further, it is not specified how innovations and new business models will work as a solution for rural development and increased working opportunities. It could be argued that the development of new techniques and business models instead might lead to fewer working opportunities by closing doors for businesses which by the strategy is implicitly determined as “unsustainable”. It is doubtful if a shift to biobased industries would offer new possibilities for those who potentially lose their jobs, as these new (and as indicated) very innovative and high-tech ‘green’ businesses will require the same kind of competencies. Moreover, it is not clearly defined how these new business models and practices will look, it is not explained how they should be implemented practically or who is in charge of this. This indicates once again that nominalisation is integrated into the strategy.

The pro-innovation bias gets visible through the incentive to strengthen Europe's competitiveness through the development and deployment of innovations. ‘Transformation of European industries’ indicates a strive for change which is connected to the concept (cf. Godin & Vinck 2017). Also, investment in “skills, knowledge and innovation” provides the potential for income diversification in the primary sector and enhanced rural economies. By mentioning investments in “skills and knowledge” as a requirement for boosting rural economies, one gets the impression that these values currently are lacking. This indicates a hegemony where rural areas are put in the periphery to ongoing developments in urban areas and as an indirect way of devaluing less developed and technologically scarce working and living practises outside cities.

4.2. Cross-sectoral cooperation & decentralization – a key for deploying R&I

As the previous sub-chapter showed, R&I is seen as a solution for a variety of problems and as the biggest aspect for successfully deploying and enlarging the bioeconomy within Europe. But a central question remains – what models and approaches are supposed to be used for realizing R&I-based solutions within the bioeconomy and who will oversee this? Looking at how bioeconomy is defined in the strategy (see pp. 13-14), it becomes clear that sectors that rely on and produces biomasses such as agriculture, forestry, fisheries and aquaculture are playing a key role in the bioeconomy and hence, allocated a vital role for enabling the transition to a bio-based economy. Another significant aspect related to the deployment of innovations and new technology is the way of addressing the need of applying a cross-cutting approach throughout the implementation of the strategy. As mentioned earlier in this thesis, the concept of ‘innovations’ is often used in policy making as a bridging concept that enables synergies between different areas and actors (Godin & Vinck 2017). The strategy strongly promotes a so-called “cross-cutting” approach for targeting and creating synergies across multiple sectors, as well for reaping the full potential of R&I:

However, it is necessary to move beyond research and innovation and have a strategic and systemic approach to the deployment of innovations to fully reap the economic, social and environmental benefits of the bioeconomy. Such an approach should bring together all actors across territories and value chains to map the needs and actions to be taken. It will require addressing the systemic challenges that cut across the different sectors, including synergies and trade-offs, to enable and speed up the deployment of circular economy models (European Commission 2018a, p.8).

It is clear that R&I according to the strategy must be implemented via a multidisciplinary and cross-cutting approach that considers potentials as well as challenges within all sectors and production areas in the bioeconomy. The reasoning behind this lies among others, in the idea that a cross-sectoral approach brings potential for increased involvement of stakeholders and cooperation between different sectors. It is further argued that increased cooperation between actors from different domains and geographical places will support partnerships and help to deliver a more sustainable and resilient bioeconomy. Cross-sectoral cooperation will for instance be promoted via the establishment of platforms for cooperation and inclusive innovation development, so-called “living labs”:

Living labs will be set-up and tested for their contribution to open, multidisciplinary and multi-stakeholder innovation in primary production on land and sea and its interfaces with bioeconomy value chains (food and biobased products). They will serve to develop solutions based on ecological and circular approaches and help the shift to a more sustainable and resilient bioeconomy. By adapting innovations to site-specific needs and involving the relevant stakeholders, they will allow and facilitate their further adoption and deployment (European Commission 2018a, p.80)

As visible in a previous paragraph and below, cross-sectoral cooperation is seen to increase citizens- and stakeholder participation and support the development of customized innovations and technical solutions adopted for site-specific needs:

Importantly, the Action Plan will promote the involvement of stakeholders across the entire value chain in Research and Innovation to ensure that research and innovation are co-designed with the future users of its results (European Commission 2018a, p.54)

Furthermore, activities will help to build new partnerships and cooperation models between the different stakeholders including citizens (European Commission 2018a, p.71)

The participation and mobilization of public and private stakeholders is also highlighted in relation to the development of technical R&I-solutions:

To accelerate the development and deployment of sustainable and circular bio-based solutions, on which the modernisation, strengthening and competitiveness of our industrial base depend, the EU will intensify the mobilisation of public and private stakeholders, in research, demonstration and deployment of bio-based solutions (Action 1.1). This includes, for example, the promotion of technologies such as artificial intelligence and innovative solutions that are suitable for small scale deployment and easy to replicate (European Commission 2018a, p.11)

Besides indicating that R&I must be developed in an inclusive manner, the phrasing highlights that technologies such as artificial intelligence indicate that ‘innovations’ are interlinked with technology. This is a crucial finding as it confirms previously presented theory on innovations as a technical dominated area (cf. Rogers 2003; Godin & Vinck 2017; Formas 2018)

These results suggest that there is great faith in cooperation and inclusive development as a successful way of implementing and enhancing R&I-based solutions. One could consider if this focus mostly functions as a political jargon for compensating the partly technical and economic approach visible in the strategy? Phrases such as “co-design”, “cooperation” and “partnership” are positive-valued words hard to contradict. It could thereby be argued that the emphasis on cross-sectoral cooperation carries intertextual traits, as the authors use already existing communication to transfer positive means into the strategy.

It could further be argued that the promotion of cross-sectoral cooperation is another way of promoting a decentralized model where the private sector and individual actors together should be in charge of the practical implementation processes of the bioeconomy. Decentralized models are often advocated to increase citizens' and actors' participation at local and regional levels, to create sectoral cooperation and for moving away from bureaucratic and top-down and constraining policy models (Kumssa 2001; Faguet 2014). Decentralized models and increased inclusiveness of stakeholders and civil society are further highlighted as an important aspect in EU policy overall, for example in the EU research and development program Horizon Europe. A leading blueprint for larger inclusion in policy-making was the so-called “Lamy report” which examined the impacts of the EU's research and innovation programs (European Commission 2017a). The report stated that increased involvement of different stakeholders and civil society in R&I processes are a way to enhance relevance, acceptance and increase benefits from R&I. Programs and policies which manage to create synergies and cross-sectoral cooperation between different areas and sectors have the greatest potential to succeed according to the European Commission (European Commission 2017a). In accordance with this, the importance of targeting local and regional actors as well as enhancing a bottom-up perspective could be seen as a recurring theme throughout the strategy, like in this quote:

A wider range of actors need to get involved, including farmers and forest owners (alone or in association), small businesses, etc. By operating at local / regional level, these models will also facilitate circular approaches between exploitations and across sectors. To achieve these objectives, small-to-medium scale solutions seem to be most appropriate. Innovative organisational models should also be developed, to promote cooperation within and outside the primary sector (European Commission 2018a, p.58)

The wording “operating at local/regional level” and “small-to-medium scale solutions” indicate that responsibility is distributed to local and regional levels which in turn could be interpreted as promotion of decentralized models. Looking at the first contributions on EMT, one could as earlier mentioned recognize that this kind of governmental distancing and favourable attitude towards market actors is typical for the theory (cf. Mol & Sonnenfeld 2000) and it could therefore be argued that the emphasis on decentralized models in the strategy is a trait from EMT.

At the same time as decentralized models carry positive connotations as described above, it could also risk creating large differences and variations when it comes to how policies are interpreted and implemented (Nationalencyklopedin n.d). There is also little evidence for decentralized models to always be the most effective choice. Policies must consider what functions that could be decentralized, within which

sectors and how to organize the joint production and services at various levels (Prud'homme 1995).

Decentralization is further advocated by highlighting that the European Commission should mainly intervene in the transition by assisting with economical financing. EU's economical capacity for promoting and enhancing R&I-based solutions connected to the bioeconomy is a recurring theme throughout the strategy, as for example:

Horizon 2020 and the European Regional Development Fund, in a complementary fashion, will continue to deliver important Research and Innovation outputs that can address cross-cutting challenges and opportunities in the bioeconomy. The Commission proposals for the next Multiannual Financial Framework for 2021- 27 intend to give a significant boost for systemic research and innovation in the areas and sectors covered by the bioeconomy (European Commission 2018a, p.7)

It is further argued that the lack of economic assets is the main barrier for the development of new solutions within the bioeconomy, as well as for enhancing the entrepreneurship of small- and middle-sized businesses. The European Commission, therefore, sees an essential need for enabling larger funding within the area. The amount of economic financing for R&I also seems to work as an indicator of how well the strategy from 2012 manages to deliver on its objectives. A review of the 2012 strategy concluded that the strategy had substantially delivered on its objectives, by concluding that there was an increased amount of economic funding available for bioeconomy-related investments under the EU Framework Programmes for Research and Innovation:

...the European Bioeconomy Strategy has substantially delivered during the past years on its objectives, through a wide array of actions ranging from the EU Framework Programmes for Research and Innovation [...] (European Commission 2018a, p. 22).

The 2017 Review concludes that "a direct result of the 2012 Action Plan is the over two-fold increase in dedicated EU funding for the bioeconomy under the Horizon 2020 programme (European Commission 2018a, pp. 53-54).

The result from the review is hence implying that the 2012 strategy managed to deliver on its many objectives, by enabling a larger amount of funding. The actual effect of the strategy (or the funding), for instance, the amount of new business, the deployment of new sustainable techniques, or the establishment of education programs is not mentioned. The hardship to measure outcomes from bioeconomy related activities has further been stressed (cf. Wydra 2020). As the amount of funding available does not tell anything about the actual effects, one could question whether larger funding for R&I really is the most successful tactic for enabling a

bio-based economy in the EU? Could the focus on increased R&I funding in fact hinder other, more instrumental tools to be applied, such as tax relives and facilitation with regards to legislative frameworks..? The strategy's focus on R&I funding as the most successful method could once again be connected to the pro-innovation bias.

4.3. R&I as part of an ecological modernization discourse

As shown in the results previous sub-chapters, the R&I discourse found in the EU Bioeconomy Strategy is linked to the deployment of economic vitality, new jobs and competitiveness. So, what lays behind this discourse? A central trait of the third dimension in Fairclough's model is to analyse how social structures such as economics and politics affect and reinforce discourses (cf. Withersen Jørgensen & Phillips 2000). This will as previously stated be done by using the Ecological Modernization Theory (EMT).

As earlier explained, the EMT introduced a new political approach that made it possible to combine environmental policy with growth- and welfare policy. This made the approach popular as it enabled a focus on both sides of the coin and thereby an opportunity to please a larger public (see Huber 2008; Mol & Sonnenfeld 2000; Hajer 1997). As R&I is central for bridging the visions of economic growth and environmental sustainability in EMT, the diffusion of the theory within policymaking also leads to a diffusion of the R&I discourse (cf. Leipold 2021; Mol & Sonnenfeld 2000; Hajer 1997). The EMT could further be seen as a major contributor to the discursive practice of the pro-innovation bias, as EMT stressed and reproduced the positive features of R&I (cf. Withersen Jørgensen & Phillips 2000; Godin & Vinck 2017). By looking at the EU Bioeconomy Strategy with the background of EMT, it becomes possible to link the R&I discourse and the pro-innovation bias to a shift in ideological beliefs and hence to a larger picture of social change in society.

When combining previous findings which indicated that the ecological modernization theory has influenced EU policy together with the pro-innovation bias, the strategy's focus on R&I as a comprehensive solution gets further explained. In the EU Bioeconomy Strategy, it seems like the bioeconomy's contribution to economic growth and increased working opportunities are considered almost equally important as its contribution to ecological sustainability and R&I is seen as a key contributor to this achievement:

The deployment of a sustainable European bioeconomy would lead to the creation of jobs, particularly in coastal and rural areas through the growing participation of primary producers in their local bioeconomies. In the bio-based industries one million new jobs could be created by 2030, according to industry estimates. The strong and fast-growing startup ecosystem in the biotechnology sector will play a leading role in realising this potential (European Commission 2018a, p. 5)

The confidence in R&I as a key driver for the development of new business and working opportunities gets obvious in the quote above. The words “strong and fast-growing” indicates confidence and trust in the start-up and biotechnology sector which in turn indicates a focus on technological innovations. Altogether, this phrasing communicates a modality that strengthens the vision of new and hitherto unexplored business within the (bio-) technological sector as a great potential for unlocking working opportunities. This narrative goes well together with EMT and with the pro-innovation bias, as technological innovations among others are seen as a solution for growth (cf. Mol & Sonnenfeld 2000; Godin & Vinck 2017).

The vision to use innovations as an interdisciplinary solution for creating sustainable practices as well as an enabler for economic competitiveness further becomes visible in the following quote:

By capitalizing on unprecedented advances in life sciences and biotechnologies, as well as innovations merging the physical, digital and biological worlds, the European industrial base can maintain and enhance its global leadership (European Commission 2018a, p. 6).

The phrasing “maintain and enhance its global leadership” indicates influences from ecological modernization theory where innovations are obviously seen as key drivers for enabling continued growth in the EU. Through the reasoning above, reasoning, EMT and the pro-innovation bias become visible by following:

- Through the beliefs in innovations to interweave the conflicting interests of ecological sustainability and economic growth
- Through the way innovations are used to gain political support as innovations are an uncontested value (cf. Godin & Vinck 2017).

The view of R&I as a comprehensive solution for solving societal challenges seems to be shared by a larger public as well. This became clear after a review of the European Bioeconomy strategy from 2012 which stated the following:

Many respondents stated that the European Bioeconomy Strategy and the Action Plan should further support strategic Research and Innovation. This latter is crucial for providing solutions

to the challenges of our time. It delivers on citizens' priorities, as embodied in the Sustainable Development Goals and in the Paris Agreement on fighting climate change, on growth and jobs, and to solve the global challenges we face today and will face tomorrow. Moreover, Research and Innovation determines the productivity and competitiveness of our economy: about two-thirds of Europe's economic growth over the last decades was driven by innovation (European Commission 2018a, p. 53).

The quote above shows how widely integrated the discourse of R&I as a solution for sustainable development is. An interesting finding comes by looking at the text's transitivity. It seems like R&I in itself is viewed as a driver for economic growth and sustainable development, so to say, the actual agency for implementing R&I is secondary in this case. This could once again be connected to Leipold's study (2021), where it turns out that regulations and policy making no longer are seen as a necessity for enhancing environmentally friendly structures and businesses. Instead, innovating bottom-up businesses will be the key driver of new sustainable practices. Sustainable business and new, circular production chains are hence seen as a result of innovation and new technologies rather than a result of strategic policymaking (Leipold 2021).

The third dimension in Fairclough's model poses questions such as if the discourse at issue contributes to the replication of discursive order. The analysis shows that the strategy's focus on R&I contributes to a discursive order where R&I is seen as a comprehensive solution for a variety of problems and hence to enforcing the pro-innovation bias. As touched upon earlier, this might become troublesome if the pro-innovation bias establishes uneven power relations where R&I are seen as the rational choice whereas opponents to innovations or those who are unable to adapt to innovative changes become the losing part (cf. Winther Jørgensen & Phillips 2000).

5. Discussion

This chapter aims to deepen the results presented in the previous chapter. Sub-chapter 5.1 problematizes the findings of R&I and suggests some alternative approaches to R&I. Sub-chapter 5.2 discusses whether cross-sectoral cooperation and decentralization manage to deliver on expectations while 5.3 deepens into how EMT has emerged and how the theory affects policies.

5.1. Examining the pro-innovation bias - what has been left out?

As touched upon earlier, the pro-innovation bias is visible in the strategy as innovations are talked about as something solely positive and as R&I is seen as a comprehensive solution to a variety of challenges. There is however reason to question if R&I really can meet these expectations and if the strong belief in R&I might even have a detrimental effect? Godin & Vinck (2017) are challenging the pro-innovation bias by highlighting what most other scholars have left out, for example, deconstruction of innovations. Innovations are deeply attached to the introduction of something new, regardless of if the innovation is considered to be technological, social or structural innovation. Godin & Vinck (2017) argues that it seems like the novelty aspect seems to carry positive features, even though the innovation per se is not better than an existing product or course of action. The authors argue that this might be because the common perception is to associate innovations with the potential to create something which (maybe) brings possibilities for enhanced practices or products in the future (ibid).

Could the “novelty” aspect of innovations hinder other approaches, such as maintenance of existing innovations to take a greater place in policy documents such as the EU Bioeconomy Strategy? Karl-Heinz Leitner (2017) is for instance arguing whether there might be reasons for not innovating, for instance, due to increased market pressure and risk of striking out products or practices which already are sufficient. The author argues that the increasing numbers of innovations at the market in combination with a globalized society have led to an “innovative treadmill”, where the fast acceleration of new technologies and products leads to

increased market pressure and to the encouragement of intensive consumption patterns (Leitner 2017). This could be associated with the emerging debate on product quality issues, where the life expectancy for products is getting shorter in combination with difficulties to repair and replace parts. In a program produced by the Swedish radio program P1, this is among others due to an increased market race, as the pressure to develop new and cheaper products has led to trade-offs when it comes to product quality and production sustainability (cf. Sveriges Radio 2019). In a nutshell, if R&I leads to an increased production and consumption pace, this could be seen as an example of a negative aspect of promoting R&I, masked by the pro-innovation bias.

Another aspect that is set aside, is the potential of deconstruction of innovations. (Kimberly 1981) writes that the removal of an innovation (a product or a practice) could be used as a tool for getting away from something which no longer is sustainable, and Paech and Liebelt (2012) argues that this kind of removal opens up for even better solutions to be adopted (Paech & Liebelt 2012). It is possible to draw parallels with the potential positive effect of deconstruction of innovations and the COVID-19 pandemic in 2020-21. The spread of the Coronavirus forced society to quickly adapt and to change routines and practices, for example regarding travelling, social interaction and meetings. Digital meetings replaced physical meetings which resulted in a significant reduction of climate emissions from cancelled travels (Froster 2020). This is an example of how the removal of one innovation, such as emission-generating transports like aircraft, actually lead to more sustainable practices with regards to the climate. It is, therefore, possible to argue that deconstruction of innovation could bring positive benefits. This is further something that the EU Bioeconomy Strategy misses to consider.

Another aspect that is not considered in the strategy, is potential problems for people to adapt to new techniques or practices. Potential "losers" of innovations is not mentioned in the strategy, that is to say, actors who might be unable to directly benefit from an increase of new techniques or practices. It could for instance be individuals, small- and middle-sized businesses with less economic capacity to incorporate expensive technological advanced tools, labour (if R&I leads to more automatization of labour-intensive practices), as well as people living in geographic areas where the infrastructure for R&I is less developed. Contrary, these can be trapped in a dependency position when actors with better capacity to gain from increased development of R&I take the lead. To give an example, it has been shown that people living in rural areas have fallen behind as the digital transition has developed differently in different geographic areas. As in the case of Sweden, people living in the very north of the country have lost communication abilities when copper-based networks (i.e. telephone) are phased out in favour of

modernized wireless access networks such as 3G mobile communications or fibre (Fröberg 2021). This example illustrates how innovations might lead to negative impacts for already vulnerable groups and it could further be argued that the promotion of R&I in the EU Bioeconomy Strategy carries hegemonic features as R&I might lead to an increase of incoherence and uneven power relations among centra-periphery areas in EU member states (cf. Winther Jørgensen & Phillips 2000).

5.2. Are cross-sectoral cooperation and decentralized models overestimated?

Looking more deeply into the reason why cross-sectoral cooperation has gotten such a large focus in the strategy, a possible explanation could be that this is an attempt to contribute to larger inclusiveness of the public sector in the implementation process of R&I. The importance of including market-based actors and civil society in processes of designing and implementing innovations and new techniques have during recent years been stressed as an important aspect for deploying successful R&I-policy (European Commission 2017a). In the earlier presented Lamy report, it is, for instance, suggested that a key action for reaching the potential of cross-sectoral cooperation is to turn the EU into a “living lab”, where citizens and stakeholders are allowed to actively participate in the development of new innovative solutions to societal challenges (European Commission 2017a). Several similarities to this reasoning are found in the EU Bioeconomy Strategy, for instance, the potential of turning the EU into a living lab (cf. European Commission 2018a, pp. 14, 80, 81).

The findings in the Lamy report as well as within Horizon program, align with the results in this thesis where the inclusion of market-based sectors is highlighted as an important source for developing and implementing innovations. As decentralization and larger inclusiveness of stakeholders’ participation obviously are promoted in EU innovation policy overall, the focus on cross-sectoral cooperation in the EU Bioeconomy Strategy could be interpreted to be part of an (additional) discursive practice.

A recurring issue related to the promotion of increased participation and decentralized models found in the strategy is the fact that little is said about how stakeholders ought to get together and who should take the responsibility for enabling decentralized grass-root development. It could be interpreted as this is simply being handed over to stakeholders and market actors to solve on their own

and hence as withdrawal of agency (cf. Winther Jørgensen & Phillips 2000). Sodano (2013) adds to this, writing that promoting ‘collaboration’ and ‘networking’ is a way to create consensus on the bioeconomy and to gloss over potential disagreements which might arise with the increased use of renewable resources and technologies. Moreover, avoiding mentioning individual sectors, companies and specific institutions could be seen as a discursive strategy for concealing hegemonic features (Sodano 2013). As the EU Bioeconomy Strategy does not mention any actors in specific but rather speaks of the transition to a bio-based economy as something which concerns everyone, this gives the impression that the promotion of innovations within the bioeconomy also will create equal opportunities for all, which as earlier mentioned, might not be the case.

It should further be mentioned that even though decentralized governance is argued to bring several positive effects (cf. Kumssa 2001; Faguet 2014), this approach is also criticized in relation to R&I development. Pfotenhauer and Juhl (2017) argue that the best chances to achieve courageous and game-changing innovations occur when the state takes actively part in the innovation development, referring to state-driven innovations such as the Apollo Program, the Green Revolution, construction of railroads and the evolution of the internet. This argument is among others, grounded in thoughts that the state has a larger economic capacity and therefore in position to make high-risk investments (Pfotenhauer & Juhl 2017). Other scholars add to this reasoning by highlighting that market-driven innovations may not always result in positive outcomes, mentioning so-called “outlaw innovation” such as file-sharing or data hacking (Söderberg 2017). Regarding the promotion of increased stakeholders’ participation, the Swedish research council Formas writes that there are both ethical and methodological challenges attached to the involvement of citizens and stakeholders in R&I development. First, inclusive research is time-consuming and requires larger financial investments. Secondly, this type of approach risks creating a “democratic fraud”, where stakeholders seem to have equal opportunity to impact while the reality turns out to be different. Aspects such as gender, political paradigms, traditions and experiences of the stakeholders at issue can affect who is listened to and given the mandate to participate in developing processes (Formas 2018).

There is hence a reason to question whether decentralized models unanimously a good thing in the development of R&I is and whether the effects of increased participation and cross-cutting approaches manage to deliver on its expectations. Maybe the EU needs to more actively lead the development of R&I-based solutions and a bio-based economy, instead of primarily serving as an economic facilitator of R&I while the responsibility is handed over to the market. This is however contradictory as the EU does not have the mandate to employ actions that could be

handled effectively by member states themselves, as this would be against the principle of subsidiarity (European Parliament 2021). It should additionally be mentioned that several successful outcomes are deriving from increased stakeholder participation and cross-sectoral cooperation. The strong tradition of engagements within the civil society in Sweden has for instance resulted in innovations such as libraries, the Swedish coast guard, service dogs etc. (Formas 2018). As an example of successful cross-sectoral cooperation between the forest and textile industry, the Swedish forest association and industry group Södra has developed a process for recycling discarded textiles by separating fibres from outworn textiles and mixing these into the production of biomass which could be used to produce new textiles (Södra 2019). In conclusion, the cross-cutting and inclusive approach visible in the EU Bioeconomy Strategy is per se not a bad thing, but the reasoning above does however show that it is necessary to consider potential pitfalls and negative impacts of promoting models for decentralization and cross-sectoral cooperation, as well as to consider what tools regarding economic financing, time and knowledge that are required to fully reach the benefits from these models.

5.3. Understanding the implications of ecological modernization

The ecological modernization theory has as earlier discussed, been criticized for maintaining status-quo in environmental policy as the theory legitimizes resource-intensive living practices by arguing for new innovative solutions to the sustainability issues society is facing today. Scholars on the pro-innovation bias add to this critic by highlighting that innovations in fact might not work as a holistic solution to all kinds of problems (cf. Godin & Vinck 2017; Leitner 2017; Goulet & Vinck 2017). One of the main objectives in the EU Bioeconomy Strategy is to ease pressure on the environment and climate by enhancing resource efficiency and by exchanging non-renewable resources with renewable ones. This objective could however be contested since traits of ecological modernization are visible, as EMT emphasizes the continuation of economic growth and heavy resource utilization, which until now are associated with environmentally costly practices (cf. Leipold 2021). A possible explanation to why EMT has gained ground within the strategy is the fact that EMT offers a solution for getting ‘the best of both worlds’, namely, ecological sustainability *and* economic growth. Promoting R&I is thus a cornerstone, as it is used to bridge the gaps between these areas of interest and thereby used as a tool for gaining political support. Hajer (1997) strengthens these arguments by highlighting the political value of promoting R&I as a solution for both

environmental problems and economic growth, what Hajer calls “a positive sum-game” (Hajer 1997). This reasoning is further supported by Leipold (2021), where one of the respondents in her study argues for the importance to include positive and future-oriented visions in policymaking, as this lifts the policy’s attractiveness and potential to gain political support (Leipold 2021).

In contrast to the reasoning above, one could argue if economic incentives such as continued growth and resource utilization in fact are quite a favourable tool for enabling transition into a more sustainable and resilient society? This due to the simple fact that our current social system in large part relies on the production and consumption of natural resources for development. By merging incentives and practices for production and consumption of renewable and recycled resources into our current market structure (which is the very idea of bioeconomy), it becomes possible to get away from the depletion of natural resources at the same time as growth and development are allowed to continue. Another option would be to promote a total make-over of today’s resource-demanding structures and to reset social behaviours where money and material assets constitute prosperity. Albeit the fact that several theorists such as those arguing for degrowth (degrowth could be described as a social movement promoting downscaling of production and consumption, c.f. Schneider et al. 2010) advocate this as the more long-term and holistic approach, such a structural change of society will certainly take time. Time that we, with regards to the escalating climate changes, might not afford to lose.

Turning now to discuss how EMT impacts the strategy from a larger perspective, the analysis showed that the incorporation of EMT in EU policy contributes to a discursive practice that enforces the pro-innovation bias. It also showed how these thoughts are part of a social practice, as the positive attitude towards R&I as a wholesome solution seems to be integrated at different levels of society and also put into action through strategies like the EU Bioeconomy Strategy. A central question to ask is hence what effects this might bring? Even though some EU policies such as the EU Bioeconomy Strategy is not a binding act according to EU legislation, it will still have an impact on how national policy is formed, framed, and developed. This means that the design and priorities found in the EU Bioeconomy Strategy, such as the large focus on R&I and cross-cutting models for successful deployment of a bio-based economy, are likely to be pursued within related strategies at national level. This is also confirmed by the evaluation of the EU Bioeconomy Strategy from 2012:

One of the key results of the European Bioeconomy Strategy has been to bring the bioeconomy principles and cross-cutting objectives to the attention of national and regional policy-makers, as demonstrated by the number of countries that have adopted bioeconomy policies since 2012 (European Commission 2018a, p. 22).

..In particular, the Strategy succeeded in [...] and c) encouraging Research and Innovation investments in the Member States (European Commission 2018a, p. 22).

This brings the finding to a second dimension, as the pitfalls and shortcomings brought by the EMT and the pro-innovation bias identified in this thesis, risk being spread and reproduced within other policies, both at EU and national levels. Even though challenges such as managing to create interaction between science and practice and to adopt innovation to local conditions in some places are mentioned in the strategy, this is an exception rather than the rule. With this in mind, the importance of EU strategies to carefully weigh different views as aspects and look to potential consequences gets clear, as these strategies will function as a blueprint for further work within the area.

6. Conclusion & further research

This thesis has shown that R&I is almost exclusively framed in a positive manner and hence that a pro-innovation bias is dominant in the EU Bioeconomy Strategy. The pro-innovation bias is among other visible through the way R&I is being advocated as a solution to a variety of challenges and due to its significant role in achieving all five main objectives in the strategy. The thesis has furthermore highlighted aspects of R&I which is left out in the strategy, for instance, potential negative effects such as promoting increased production and consumption activities, the risk that new technologies lead to decreased working opportunities, unequal distribution of innovations and wider gaps between geographical areas. The EU Bioeconomy Strategy further misses to consider the potential with maintenance of existing innovations and deconstruction of innovations.

Considering the second research question, what models and approaches are supposed to be used for realizing and deploying R&I-based solutions within the EU Bioeconomy Strategy and who(s) is responsible for taking actions on this, it has been shown that cross-sectoral cooperation is highlighted as crucial in the strategy. R&I could in this manner be seen as a bridging concept because of its ability to contribute to new alliances and synergies between sectors and actors at different levels. It is further shown that decentralized models seem to be promoted, as stakeholder participation and grass-root development are highlighted as an important tool within the strategy. Inclusions of stakeholders in the development of R&I-based solutions will for instance contribute to target site-specific needs, provide customized products and services and to enhance the bioeconomy overall. Market actors are in this sense addressed to carry a large responsibility for realizing the objectives in the EU Bioeconomy Strategy. These perspectives are challenged in the discussion, by arguing for the positive aspects of state-driven innovation development. The importance to consider methodological, ethical, as well as practical challenges of cross-sectoral cooperation and stakeholders' participation in policy, has further been displayed.

As an explanation to what has influenced the discourse of R&I in the EU Bioeconomy Strategy, this paper has shown that the discourse at issue could be

linked to ecological modernization theory (EMT), which is characterized by the thoughts that ecological sustainability could be reached at the same time as economic growth by developing R&I-based solutions. It has therefore been argued that the EMT contributes to the maintenance and reproduction of the pro-innovation bias and hence to the R&I discourse. The analysis shows that EMT implies an economic and socio-central approach, as the theory evolved within policy as an answer to needs of economic growth and social welfare, but also as a way to gain greater political support because of the theory's capacity to bridge interests of economic growth with sustainability. The discussion scrutinizes whether the influences of EMT and hence the pro-innovation bias might lead to status-quo for ecological sustainability, as the theory argues for a continuation of economic growth and hence indirectly for resource-intensive living practices. It is however argued that ignoring economic incentives in policy is not considered an efficient option, as this goes against the very structure of our current society. To conclude, by using the theoretical framework of EMT, it is possible to show how the discourse about R&I and the pro-innovation bias is part of a larger social practice as the positive attitude towards R&I are legitimized by the theory and reproduced through the creation of strategies like the EU Bioeconomy Strategy.

This thesis has aimed to analyze how R&I is framed and considered in the EU Bioeconomy Strategy in order to contribute to a more comprehensive approach to R&I. The fact that the EU Bioeconomy Strategy seems to carry several traits of the pro-innovation bias and ecological modernization theory could be seen as a trigger for other policies, models, language, norms and social interactions within the field to develop similar approaches. This could in turn, risk downplay potential negative aspects of R&I, likewise important to consider for successfully scaling bio-based economies and for enabling a sustainable transition of the society. Developing successful bioeconomies are additionally important from a rural development perspective, considering that increased use of renewable resources will boost businesses operating within the primary sectors such as agriculture, forestry, aquaculture and fisheries. The findings presented in this thesis provide suggestions to how future policy could be developed to adopt a more comprehensive attitude towards R&I. The analysis has moreover thrown up several questions in need of further investigation. Research on positive effects as well as difficulties emerging from R&I-incentives, should preferably be carried out to fully understand the implications of promoting R&I-based solutions in policy. It would further be necessary to investigate under which forms the involvement of stakeholders and actors in charge for developing and realizing R&I-based solutions are best suited, as the analysis shows that there are several challenges connected to this. Lastly, further analysis on how EU policy affects national policy would be useful in order to establish a greater degree of accuracy on this matter.

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