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MASTER PROGRAMME IN INTERNATIONAL BUSINESS & ENTREPRENEURSHIP

RESPONSABILIZZARE I GIOVANI NELLA BIOECONOMIA

EMPOWERING YOUNG PEOPLE IN THE BIOECONOMY

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Abstract

Questa tesi di master esplora le opportunità e le sfide per i giovani, di età compresa tra i 15 e i 24 anni, nel partecipare alla transizione verso la bioeconomia. Utilizzando i dati di un sondaggio condotto tra i giovani di tutta Europa, lo studio esamina la loro consapevolezza, l'integrazione scolastica, le opportunità di lavoro e l'impatto delle politiche governative sul loro coinvolgimento nella bioeconomia.

I risultati mostrano che i giovani hanno una discreta consapevolezza della bioeconomia e che i livelli di istruzione più elevati sono associati a una migliore comprensione dell'argomento. È necessario un programma di studi standardizzato, poiché i temi della bioeconomia non sono coerentemente incorporati nell'istruzione formale. Nella bioeconomia, le opportunità di lavoro sono altamente correlate al livello di istruzione e si ritiene che esistano maggiori opportunità per coloro che hanno qualifiche migliori.

Le politiche governative sono importanti. Mentre alcune incoraggiano con successo la partecipazione degli adolescenti attraverso sforzi lavorativi e programmi educativi, altre mancano delle risorse e dell'enfasi necessarie. Lo studio conclude che per incoraggiare i giovani a partecipare alla bioeconomia è necessario migliorare l'educazione alla bioeconomia, sviluppare opportunità di lavoro eque e mettere in atto una legislazione di support

I politici, gli educatori e i dirigenti d'azienda possono trarre vantaggio dalle intuizioni di questa ricerca sull'importanza di rispondere alle esigenze educative e lavorative dei giovani per incoraggiare il loro coinvolgimento attivo nella bioeconomia. Gli studi futuri dovrebbero concentrarsi sulle competenze necessarie ai giovani nella bioeconomia e sugli effetti a lungo termine della loro partecipazione allo sviluppo sostenibile.

Abstract

This master thesis explores the opportunities and challenges for young individuals, aged 15 to 24, in participating in the transition to a bioeconomy. Utilizing survey data from young people across Europe, the study examines their awareness, educational integration, job opportunities, and the impact of government policies on their involvement in the bioeconomy.

The results show that young people have a reasonable awareness of the bioeconomy, and that higher education levels are associated with a better understanding of the topic. Standardized curriculum is necessary since bioeconomy themes are not consistently incorporated into formal education. In the bioeconomy, job opportunities are highly correlated with educational achievement, with greater opportunities thought to exist for those with better qualifications.

Government policies are important. While some successfully encourage adolescent participation through job efforts and educational programs, others lack the necessary resources and emphasis. The study concludes that encouraging young people to participate in the bioeconomy requires improving bioeconomy education, developing fair work opportunities, and putting supportive legislation in place.

Policymakers, educators, and business executives can benefit from this research's insights into the significance of attending to young people's educational and job needs to encourage their active involvement in the bioeconomy. Future studies ought to concentrate on the competencies needed by youth in the bioeconomy and the long-term effects of their participation on sustainable development.

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1. Introduction

In today's world, where pressing environmental concerns loom large, the necessity for innovative technologies and sustainable practices has never been more apparent. The emergence of the bioeconomy, a paradigm shift utilizing biological resources for sustainability across various sectors, offers a promising response to these challenges (Pyka, 2020; Lewandowski, 2017). However, while extensive research has delved into the technological, entrepreneurial, and governmental dimensions shaping the bioeconomy, there remains a notable gap in understanding its social aspects, particularly concerning the involvement of young people (Paris et al., 2023; Bogner & Dahlke, 2022).

In particular, the part played by young people—those between the ages of 15 and 24 this revolutionary process has received very little attention in academic discourse. By shifting scholarly attention to the social dimensions of the bioeconomy and emphasizing the engagement and empowerment of the younger generation, this study seeks to close this gap in knowledge (Pubule et al., 2020; Ouko et al., 2022).

1.1 Motivation

Having been raised in a world that is progressively more endangered by environmental emergencies, I have cultivated a profound and ingrained enthusiasm for sustainability and societal transformation. Observing directly the immediate necessity for inventive solutions to tackle severe environmental issues has intensified my determination to investigate the involvement of young individuals in crafting a more sustainable future through the bioeconomy.

The bioeconomy, which focuses on the utilization of biological resources to achieve sustainable growth in several sectors, offers a possible solution to tackle these difficulties. Although previous studies have thoroughly investigated the technological, entrepreneurial, and political

components of the bioeconomy, there is still a significant lack of understanding regarding its social dimensions, specifically in relation to the participation of young individuals. (Paris et al., 2023; Bogner & Dahlke, 2022).

This research is motivated by a need to address the lack of information and provide insight into the distinct opportunities and difficulties encountered by young individuals in the bioeconomy. This study seeks to contribute to the advancement of more inclusive and equitable approaches to sustainability by examining the social dynamics of the bioeconomy and promoting the involvement and empowerment of the younger generation. My own motivation arises from a deep conviction in the capacity of young individuals to initiate beneficial transformations and a dedication to discovering ways in which they may actively contribute to a future that is both environmentally sustainable and socially responsible.

1.2 Relevance of The Research Topic

Youth empowerment in the bioeconomy is a topic that requires investigation in order to address current environmental problems and drive sustainable development. The bioeconomy seems to be a feasible route toward long-term solutions given global concerns about resource depletion, biodiversity loss, and climate change (European Commission, 2018). For several reasons, it is critical to understand how young people, defined as those between the ages of 15 and 24, fit into the bioeconomy. First, a significant portion of the population, young people can inspire innovation and change (European Commission, 2018). They will play a critical role in shaping the direction of sustainable development in the future because of their energy, creativity, and adaptability.

Second, involving youth in the bioeconomy guarantees the long-term sustainability of practices while simultaneously addressing the urgent demand for skills and experience (Paris et al.,

2023). Giving young people the right tools, information, and opportunity will help us develop a new generation of leaders who are dedicated to social responsibility and environmental care. In addition, youth involvement in the bioeconomy promotes creativity and diversity (Bogner & Dahlke, 2022). Their distinct viewpoints, backgrounds, and concepts aid in the creation of more inclusive and potent responses to difficult environmental problems.

Applying this knowledge to policy and practice can help ensure that youth in the bioeconomy have access to the opportunities and difficulties that they present (Pubule et al., 2020). Through the identification of obstacles to youth involvement and the implementation of focused solutions, educators, businesses, and legislators may establish a supportive environment that promotes young empowerment and sustainable development. In general, the potential for youth empowerment research to promote positive social and environmental change makes it relevant in the context of the bioeconomy. We can create a future that is more resilient, inclusive, and sustainable for future generations by utilizing the energy and talent of young people.

1.3 Importance of the Study

This research is significant because it adopts a fresh perspective on the bioeconomy, emphasizing its social dimensions and young people in the 15–24 age range. The study intends to provide new insights by elucidating the complexities of their involvement, objectives, and challenges within the bioeconomy (Boogaard et al., 2022). It argues for inclusive tactics that harness the energy and creativity of the younger generation while also improving our knowledge of this paradigm shift (Herman et al., 2021). The thesis serves as a guide for advocating a more all-encompassing and fair approach to the development of the bioeconomy, ultimately cultivating a sustainable and socially responsible future.

The study advances our understanding of the revolutionary potential of the bioeconomy (Sotiriou et al., 2023). It provides insights that can guide practices and policies targeted at empowering adolescents in the bioeconomy by illuminating the opportunities and difficulties faced by young people (Malsch & Luepkes, 2020). This is considering how critical young participation is to advancing sustainable development and solving urgent environmental issues.

Additionally, the study's focus on fairness and inclusivity is consistent with the growing understanding of the necessity of socially conscious business operations (Ghisellini et al., 2020). The study supports a more holistic approach to sustainability, which is increasingly valued by organizations and management practices, by arguing for the engagement and empowerment of the younger generation.

In general, the study's advancement of information regarding the social aspects of the bioeconomy and its consequences for youth empowerment has important management and business practice ramifications. It offers insightful information that can guide plans of action and strategies meant to promote a more environmentally and socially conscious way of doing business.

1.4 Problem Statement

While the bioeconomy is becoming more widely acknowledged as a workable solution to environmental problems, little is still known about its social dimensions, particularly with regard to the involvement of young adults in this sector who are between the ages of 15 and 24 (Paris, 2023; Pyka, 2020). While a great deal of research has been done on the technological, entrepreneurial, and governmental aspects of the bioeconomy, less is known about the specific opportunities and difficulties that young people in this setting experience.

There are several important issues raised by this comprehension deficit. Initially, it hinders the full utilization of youth potential to accelerate the transition to a bioeconomy. In the absence of a thorough comprehension of the factors that impact teenage empowerment and involvement, legislators, businesses, and educators may have difficulties in formulating effective policies and programs that encourage youth engagement in sustainable practices (Paris, 2023). In addition, there is a chance that the absence of youth from discussions and decision-making related to the bioeconomy may reinforce inequality and limit the variety of perspectives. Neglecting the viewpoints and direct experience of youth keeps us from making important discoveries that could help us create more thorough and effective plans for sustainable development.

Therefore, the purpose of this thesis is to examine the opportunities and challenges that young people have when they make the shift to a bioeconomy. This study intends to examine several factors, such as awareness levels, educational integration, job opportunities, and governmental laws, to gather information that may be utilized to create practices and policies that support youth in the bioeconomy. Decision-making procedures in this field can benefit from the study's conclusions (Tunstall, 2022). The goal of this research is to have a thorough understanding of the views and experiences of young people in Europe's bioeconomy. To collect data, it will employ a survey-based methodology. The intention is to support the development of socially conscious and sustainable practices in this area.

1.5 Research Aim & Objectives

Aim:

The aim of this research is to investigate the opportunities and challenges for individuals aged 15 to 24 to participate in the transition to a bioeconomy, with a focus on understanding their

awareness, educational preparedness, employment prospects, and the influence of government policies.

Objectives:

The aims of this study are to determine the degree of awareness that young people between the ages of 15 and 24 have about the bioeconomy, investigate how bioeconomy-related topics and ideas are incorporated into formal curricula for young people, assess the employment opportunities that the bioeconomy sector offers to young people with different educational backgrounds, assess the impact of government policies and initiatives on youth involvement in the bioeconomy, and pinpoint perceived barriers and facilitators for young people to engage in bioeconomy-related activities. By fulfilling these goals, the research hopes to offer insightful information about the elements influencing young people's involvement in the bioeconomy and aid in the creation of programs and policies that will enable youth to play a significant role in shaping a sustainable future.

Research Questions

Main Research Question: What are the opportunities and challenges for individuals aged 15 to 24 to participate in the transition to a bioeconomy?

Further Research Questions:

- How do job opportunities vary for young people with different levels of education within the bioeconomy?
- What is the level of awareness among young individuals aged 15 to 24 regarding the concept of bioeconomy?
- How do government policies and initiatives support or hinder youth involvement in the bioeconomy?

The purpose of these study questions is to shed light on the variables that affect young people's involvement in the bioeconomy, such as their awareness levels, educational backgrounds, career opportunities, and the impact of governmental regulations. The study aims to enhance comprehension of the obstacles and prospects encountered by youth in forming a sustainable future via the bioeconomy by tackling these inquiries.

1.6 Existing Research Gap

The lack of focus on the specific skills and abilities required for young people to actively engage and lead in the transition to a sustainable bioeconomy is a potential research gap in this field. This gap could be a potential barrier to research in this area. The literature that is now available places a strong emphasis on the significance of education and training for professionals working in the bioeconomy; nevertheless, there is a lack of awareness regarding the specific requirements and viewpoints of young people who are joining this industry (Pubule et al., 2020).

There is a lack of a thorough evaluation of training methodologies and approaches across higher education, vocational education, and training, which is another potential research need that has been identified in the field of bioeconomy education and training. The existence of this gap indicates the necessity of conducting additional research into the unique educational methodologies that are utilized in the bioeconomy sector to have a better understanding of how to effectively empower young people in this respective subject. By filling in this knowledge gap through additional research, it has the potential to make a significant contribution to the existing body of knowledge concerning the empowerment of young people in the bioeconomy (Pubule et al., 2020).

While the body of literature that currently exists carefully studies government policies, technological developments, and entrepreneurial tactics in the context of the bioeconomy, there is a clear gap in knowledge on the social complexities, particularly as they relate to the participation of young people (ages 15 to 24). This divide prevents a thorough understanding of the bioeconomy's revolutionary potential as well as insights into the unique responsibilities and difficulties experienced by young people.

1.7 Research Approach

This study uses a qualitative methodology, concentrating on the gathering and examination of qualitative data to explore in detail the opportunities and difficulties faced by people between the ages of 15 and 24 as they participate in the shift to a bioeconomy.

Open-ended & close ended survey questions were used to collect data from a broad sample of young people throughout Europe. These questions explored their personal accounts, unique viewpoints, and complex beliefs about their role in the bioeconomy. A thorough thematic analysis was conducted as part of qualitative analysis to identify recurring themes, underlying narratives, and minute nuances that are hidden within the data.

Using a qualitative survey methodology, this study aims to provide a thorough grasp of the complex social processes behind young participation in the bioeconomy. This approach makes it possible to thoroughly examine the many experiences and points of view of young people, providing priceless insights that are crucial for guiding the creation of effective policies and practices.

1.8 Structure of the Work

The thesis is structured into several chapters, each focusing on different aspects of the research topic. The introduction gives a general review of the research issue, outlining the significance of the study and the thesis's structure in addition to the reason for the investigation, problem statement, objectives, and research questions. The literature review that follows examines prior research on the bioeconomy with an emphasis on young people's involvement and social aspects. It presents a theoretical foundation for the investigation, highlights gaps in the literature, and analyzes earlier research findings.

The study's research methodology, including the survey-based strategy used to gather information from youth around Europe, is covered in the methodology chapter. It also includes details on the survey's design, the data gathering procedure, and the data analysis methods. The survey results are presented in the results chapter, which also includes quantitative and qualitative information about young people's awareness, perceptions, and involvement in the bioeconomy. The information is analyzed to detect patterns, trends, and insights that are pertinent to the study objectives. In the discussion chapter, the study's findings are interpreted considering theoretical frameworks and previously published works. The implications of the findings for theory, practice, and policy are also discussed, and potential directions for future research are noted.

In the conclusion chapter, the main results of the study are outlined along with their implications for management and business practices. The study's shortcomings are also discussed, and suggestions for further research and application are made. All things considered, the thesis's structure permits a thorough investigation of the study issue, from a survey of the literature to the gathering and examination of empirical data to the discussion of the implications for theory, practice, and policy.

2. Literature review

2.1 Overview of the Bioeconomy

The bioeconomy has attracted a lot of attention lately and has become a focal point for many nations and areas that are trying to promote sustainability and growth. According to McCormick et al. (2013), although the bioeconomy concept has potential, it runs the risk of obscuring alternative perspectives and being seen as a technical solution to difficult socio-economic and environmental problems.

International organizations have had a significant impact on how different countries have approached the bioeconomy. With its policy agenda on the bioeconomy in 2009, the Organization for Economic Cooperation and Development (OECD) was crucial (Staffas et al., 2013). The strategies and policies that have been established to encourage bioeconomic development by countries like the United States, Canada, Sweden, Finland, Germany, Australia, and the European Union all bear evidence of this influence. Forestry stands out as a major player in the Bioeconomy, making a substantial contribution to both conventional and novel products. Ollikainen (2014) draws attention to the forest sector's diverse function, which goes beyond the manufacturing of conventional items to include the creation of innovative forest products and bioenergy. But forestry's incorporation into the bioeconomy also brings potential and problems for managing natural resources at the national and international levels (Marchetti et al., 2015).

Different regions have different priorities and goals, which is reflected in how they conceptualize the bioeconomy. For example, the bioeconomy is seen as a means of attaining competitive economic growth in Latin America, where the production of biofuels and economic output are prioritized (Cv et al., 2017). Notwithstanding these regional differences, putting the

bioeconomy into practice continues to be a major problem marked by changing definitions and conceptions impacted by different players, motivations, and goals (Oguntuase, 2017).

The bioeconomy in the US has evolved significantly over time, leading to a formal description and an extensive evaluation of its size and reach (Frisvold et al., 2021). Furthermore, the bioeconomy and agricultural sustainability are greatly enhanced by the worldwide production and application of biomass (Antar et al., 2021). All things considered, the bioeconomy offers a convoluted network of interrelated difficulties and chances for long-term, sustainable economic growth. Recognizing its importance in tackling urgent socio-economic and environmental concerns, nations throughout the world are actively striving to build policies and strategies to exploit its potential (Morone et al., 2022).

A knowledge-based bioeconomy must go through several stages of development, including entrepreneurship, innovation, saturation, consolidation, and decline. The cross-sectoral nature of the bioeconomy will bring to the creation of new industries as well as the revival of old ones. Social innovation, education, and consumer acceptance are critical to the bioeconomy's success. The process of transition is greatly aided by digitization, which creates new avenues for investment and economic expansion. The transformation process will involve traditional and biobased industries concurrently, resulting in complexity and distributional implications that must be handled for societal acceptance. To continue creating value, businesses need to adjust to the changes brought about by the bioeconomy.

Depending on how networks are developed, the bioeconomy may cause regional convergence or divergence. To steer the transition process towards a knowledge-based bioeconomic system, political influence is crucial. The bioeconomic transition cannot succeed without innovation and societal commitment. Governments have a duty to do more than only fix market imperfections; they also must lower risks and create investment security. The bioeconomy has

great technological promise, but political choices about how to realize this promise are essential to its success. Feedback loops between business goals, customer preferences, and political actions are necessary for the market to be innovative.

When it comes to advancing the transition to a knowledge-based bioeconomic production system, the literature on the bioeconomy places a strong emphasis on the significance of technological innovation and structural modifications. As a result of this transformation, it is predicted that resource consumption and environmental degradation, two negative outcomes of economic expansion, will be addressed in a manner that is sustainable. Furthermore, the bioeconomy contains ethical considerations such as consumer protection and ecological norms, which necessitate the adoption of a multidimensional approach to arrive at decisions that are in the best interest of the environment. In addition, the success of the bioeconomy is dependent on the functioning of the market, innovation, and evolving perspectives among consumers. When all factors are taken into consideration, the bioeconomy is a complex and ever-changing system that requires an understanding of all its constituent pieces and the ramifications for the continued development of sustainable practices (Pyka 2020).

Bioeconomy education in the EU currently prioritizes the cultivation of practical skills and the utilization of multidisciplinary methodologies. Higher education, vocational training, and brief courses are some of the methods employed to address knowledge deficiencies and guide the creation of educational programs. The bioeconomy comprises five key themes: food/agriculture systems, forestry/natural habitats systems, water systems, bioenergy, and biomaterials/bio-based goods. In the field of bioeconomy, diverse teaching approaches such as short-term training, higher education, and vocational training are employed. Gathering data from various sources is done to evaluate the existing teaching techniques in the field of bioeconomy, with a particular focus on sustainability and innovation. Various programs, training courses, and

online resources are available to provide education to individuals interested in sustainability, entrepreneurship, and the bioeconomy. Interdisciplinary, sustainability-focused higher education programs at the bachelor's, master's, and doctorate levels are offered in the European Union. (Paris et al., 2023)

A research gap in the subject of bioeconomy education exists due to the scarcity of vocational education and training (VET) programs that are expressly designed for the bioeconomy industry. Additional research is required to investigate the advancement and incorporation of VET programs into current frameworks to facilitate the enhancement of skills in the bioeconomy. (Paris et al., 2023, page 13) This discrepancy underscores the need for specialized training programs that provide individuals with the practical expertise and knowledge necessary to succeed in occupations related to the bioeconomy. Comprehending the precise skills and competencies required for the transition to the bioeconomy is essential to create vocational education and training programs that effectively fulfill industry requirements. Moreover, doing research that specifically examines the incorporation of entrepreneurial education into bioeconomy training programs has the potential to improve sustainability and foster innovation in the industry. By resolving these areas of insufficient research, stakeholders can enhance their ability to equip individuals for professions in the bioeconomy, so promoting the expansion and long-term viability of this emerging field.

2.2 Technological, Entrepreneurial, and Political Perspectives in Bioeconomy in Europe

With the primary objective of reducing harmful environmental effects, the bioeconomy has become a revolutionary economic paradigm in the field of science, technology, and innovation (STI) policy (Backhouse et al., 2022). Interestingly, the European Union and Germany have started working together to lead a global change initiative. They are investing in technology

and research to help move away from fossil fuels and toward renewable energy sources, and they are also creating a framework for a circular economy (Backhouse et al., 2022).

Nonetheless, the worldwide production of biomass has highlighted innate disparities in the exchange relationships between semi-/peripheries that produce biomass and processing centers. This has prompted important questions about how the bioeconomy can be involved to address global material flow imbalances and alter the dynamics of knowledge production (Backhouse et al., 2022). This finding emphasizes the need for sophisticated strategies to alleviate inequalities and promote fair global participation in the bioeconomy.

Promoting technology transfer in industrial biotechnology through university spin-offs is a key tactic from an entrepreneurial standpoint (Hird et al., 2004). As Hird et al. (2004) point out, the meso-level viewpoint emphasizes the critical role that entrepreneurship plays in promoting sustainable transformation within the bioeconomy. Furthermore, the social aspects of a bioeconomy centered on forests in Europe highlight the importance of enterprises and technology as the main topics of political discussion (Hird et al., 2004).

Although bioeconomy efforts are moving in a good direction, criticisms have been made of the European bioeconomy policy's disregard for farmers' duties and its excessive emphasis on industrial perspectives (Ramcilovic-Suominen and Pülzl, 2023). This emphasizes how important it is to have a more inclusive approach to bioeconomy policymaking, incorporating the viewpoints and concerns of all parties involved, including farmers, to guarantee a comprehensive and long-lasting shift towards a bio-based economy in Europe.

In conclusion, the bioeconomy highlights critical issues like global inequality, the critical role of entrepreneurship, and the necessity of inclusive government, even as it also offers tremendous potential for innovation and sustainable development. To fully realize the promise

of the bioeconomy as a catalyst for beneficial environmental and socioeconomic development, it is imperative that these issues be addressed.

2.3 Social and Societal Dimensions

The social and societal aspects of the bioeconomy in Europe have garnered a lot of attention in recent years, and many academics have contributed insightful analyses into this complex field. Cook et al. (2002) illuminated the inequalities associated with hazardous motherhood, highlighting ongoing difficulties despite legislative changes in former European colonizing nations, especially in areas that broke free from colonial rule. This demonstrates the lasting effects of past injustices and the necessity of all-encompassing solutions to deal with systemic problems.

In their exploration of the complex relationship between societal embedding and corporate social responsibility (CSR), Midttun et al. (2006) noted a discernible movement towards more expansive societal contexts after exposure to the neoliberal market. This progression highlights the changing nature of business involvement with social concerns and calls for a more comprehensive approach to corporate citizenship. Like this, Moreno (2006) critically analyzed the Southern European social protection paradigm, raising concerns about the durability of persistent traits in the face of changing socioeconomic environments. The ability of social protection systems to adapt to the changing requirements of various populations is called into question by this examination.

Attention has also been drawn to gender dynamics in the European workforce, as evidenced by Fahlén's (2014) study on gender variations in work-to-home conflict throughout Europe. Fahlén emphasizes the complex nature of gender inequality and the necessity of focused interventions to advance gender equality in the workplace by taking institutional and societal conditions into

account. Levidow (2015) prompted critical observations on the inclusion or contestation of agroecological concepts within existing frameworks by contributing to conversations on European transitions towards a corporate-environmental food regime. This talk emphasizes how difficult it is to move toward more sustainable food systems in the face of conflicting interests and mindsets.

The importance of good governance principles in promoting sustainability in the European bioeconomy was highlighted by Devaney et al. (2017), who placed special emphasis on responsibility and participation. This emphasizes how crucial it is to have open and inclusive governance structures in place to direct the bioeconomy in the direction of sustainable social and environmental development.

Zabaniotou (2018) conducted a thorough analysis of the EU bioenergy sector, taking into account the environmental, social, and economic aspects of sustainability. The multidisciplinary approach highlights the need for integrated approaches to sustainability problems and offers insightful information on the intricate interactions between variables affecting the bioenergy environment. According to Stern et al. (2018), who looked at Austrian viewpoints on the bioeconomy, sustainable consumption is important for promoting inclusion in the bioeconomy. This underscores the role that consumer behavior plays in facilitating sustainable transitions and the necessity of focused initiatives to encourage conscientious consumption.

At last, a comprehensive study of Italy's bioeconomy was presented by Fava et al. (2020), who also offered strategies for increasing sustainability and competitiveness. The study outlined the bioeconomy's significant contribution to the nation's economy. In addition to providing useful information on country settings, this study highlights the importance of tailored approaches to bioeconomic development. Collectively, these studies show how important governance, gender

concerns, sustainability, and societal embedding are in shaping the future of the industry, contributing to a more nuanced understanding of the social and societal dimensions of the bioeconomy in Europe.

2.4 Job Opportunities in Bioeconomy

In Europe, the bioeconomy is becoming more and more popular as a major force behind sustainability and economic progress, drawing the interest of businesses, governments, and scholars in equal measure. The European Commission estimates that the bioeconomy sector offers a huge amount of job potential; Sadhukhan et al. (2016) noted that millions of new jobs might be created over the next ten years. The European Council's strategic objectives and a wider commitment to enhancing industrial contributions to the EU GDP are closely aligned with this focus on job creation.

The imperative nature of shifting towards a bio-based economy is underscored by the need to mitigate the environmental damage caused by conventional businesses and the limited availability of fossil fuels (Sadhukhan et al., 2016). The bioeconomy tackles these urgent problems and promotes innovation and economic resilience by placing a high value on sustainable practices and renewable resources. The notion of a circular bioeconomy, which is pushed by programs like "Jobs and wealth in the EU bioeconomy - the latest figures," highlights the need of resource efficiency and waste reduction and offers chances for both economic growth and environmental preservation.

The ambitious bioeconomy policy of the European Union, outlined in documents like "A new bioeconomy strategy for a sustainable Europe," offers a thorough road map for achieving the potential of bio-based enterprises. This strategy aims to maximize the potential of the bioeconomy by making focused investments in innovation, research, and policy frameworks.

Europe wants to set the standard for sustainable development and bio-based innovation globally by encouraging cooperation between business, government, and higher education. The significance of these endeavors is additionally underscored by the perspectives furnished by the JRC - Bioeconomics dataset, which presents an all-encompassing depiction of job trends and economic contributions in the bioeconomy domain. Politicians and business leaders can use this information to track vital indicators like employment growth and value added, which they can use to develop policies that encourage competitiveness and growth.

In summary, the bioeconomy is a thriving sector of the economy that is expanding swiftly and has a great deal of potential for Europe's future success. By utilizing the full potential of bio-based industries, Europe can not only create millions of new jobs but also encourage sustainable economic growth and environmental stewardship. Europe has all it takes to lead the global transition to a stronger and more sustainable bioeconomy, including wise investments, cooperative partnerships, and forward-thinking legislation.

2.5 Education and Training in the Bioeconomy

Key elements of the bioeconomy include education and training, which are vital for producing a trained labor force and stimulating the kind of innovation required for long-term expansion. According to Srinivasan et al. (2008), biomedical informatics education is important in developing nations because it trains professionals to use bioinformatics tools for sustainable resource management. Figel (2009) highlights the growing collaboration in vocational education and training within the European Union, emphasizing the necessity of ongoing education to fulfill the changing needs of the bioeconomy. To advance ecological stewardship and resource efficiency, Viertel (2010) supports incorporating sustainable development principles into policies for vocational education and training. These policies should be in line with the objectives of the bioeconomy.

Additionally, Harausová et al. (2015) stress the need of education and training in preparing upcoming managers to apply environmentally friendly methods in bio-based firms, which will promote innovation and competitiveness. King (2016) sheds light on how national and international educational goals have changed over time, emphasizing the critical role that education plays in resolving the sustainability issues that the bioeconomy presents. Ferreira et al. (2017) emphasize the value of community engagement programs in advancing training and education possibilities, especially in removing socioeconomic barriers that prevent people from enrolling in courses connected to the bioeconomy.

Additionally, Heshmati et al. (2018) talks about cooperative initiatives meant to bolster national research capacity via specialized education programs—a crucial step in developing the next wave of leaders and innovators in the bioeconomy. In their exploration of the role of technology-enhanced learning (TEL) in higher education, Orozco-Messana et al. (2020) highlight TEL's potential to democratize access to high-quality education and give people the tools they need to make important contributions to the bioeconomy. In Pankratova's (2021) work, competency-based education programs customized for sustainable development are examined. Specifically, educators are given tools to help teach the ideas of the bioeconomy to the next generation of students.

Finally, in the context of the Asian bioeconomy, CHENG et al. (2021) evaluate the relationship between entrepreneurship and sustainable development, emphasizing the critical role that entrepreneurial activities play in fostering innovation and economic growth that is in line with bioeconomy goals. When taken as a whole, these studies highlight how vitally important education and training programs are to developing human capital and stimulating the kind of innovation required for the bioeconomy to grow sustainably.

2.6 Government Policies in Europe towards Bioeconomy

Driven by ambitious goals set by the European Union (EU) to become the most competitive and dynamic knowledge-based economy globally, while ensuring sustainable economic growth, job creation, and social cohesion, government policies towards a Bioeconomy have been a focal point in Europe in recent years (Brown et al., 2008).

This dedication to sustainability cuts across several industries. The tourism sector in Scotland, for example, has embraced a strong policy for sustainable development and implemented new growth targets that are in line with sustainability principles (Lane, 2009). Additionally, initiatives aimed at environmental innovation systems stress the significance of advancing environmentally friendly manufacturing and consumption methods globally and support a life-cycle approach to reduce negative environmental effects (Scheer & Rubik, 2006).

The economy of Europe has become more dependent on imports to meet its material needs, which has caused environmental pressures associated with material extraction and processing to move from Europe to resource-rich nations (Giljum et al., 2008). Universities are a key player in addressing these issues by supporting eco-entrepreneurship and eco-innovation. Research indicates that national governments should work closely with academic institutions to assist small businesses in eco-innovating by learning from EU initiatives that have been successful (Sáez-Martínez et al., 2014).

Furthermore, players in Germany and throughout Europe acknowledge the critical role that the bio-based industry and the circular economy play in advancing sustainability, emphasizing the necessity of cooperative efforts to fully use these sectors (Leipold & Petit-Boix, 2018). By creating novel, safer, and sustainable materials, chemicals, goods, and services, the EU hopes to take the lead in the world's shift to a circular economy (van der Waals et al., 2019). This

means creating systems for the safe (re)design of materials and chemicals, taking toxicity and lifecycle issues into account during the design phase.

Moreover, fostering safe-by-design as a new multidisciplinary approach to sustainability requires establishing an enabling environment through information sharing, instruction, and supply chain collaboration (Ahmed et al., 2016). To sum up, European governments' policies for a sustainable economy include a range of programs and sectors that support eco-friendly, innovative, and sustainable behaviors. To achieve the lofty objectives outlined for a sustainable future in Europe, cooperation between governments, academic institutions, and interested parties is essential.

2.7 Youth Engagement in Sustainable Development in Europe

In education for sustainable development, Barth et al. (2008) emphasize worldwide communication, cooperation, and active engagement with global concerns. They fund the International Virtual Seminar 'Sustainable Development in Europe and Latin America' to encourage international student dialogue. This strategy promotes intercultural understanding and sustainable development cooperation. Strachan (2018) examines how Education for Sustainable Development (ESD) may affect entrepreneurship education to create sustainable business owners. The Entrepreneurship 2020 Action Plan of the European Union promotes entrepreneurial skills and sustainable mindsets to reduce youth unemployment.

Youth involvement in sustainable development is stressed throughout the literature. Young individuals can make lasting changes in food and exercise; hence Millstein et al. (2011) recommend including them in obesity prevention initiatives. Young agripreneurship in Kenya may be a long-term solution to rural unemployment and poverty, according to Ouko et al.

(2022). This is consistent with Youniss et al. (2009)'s discussion of youth civic engagement and Brennan et al. (2009)'s study of community and youth development.

Additionally, McCloskey (2014) examines how critical thinking and development education may engage kids and teach them metacognitive abilities for sustainable development. Sloam (2014) examines how new media affects European youth activism, particularly in response to socioeconomic challenges like the European financial crisis and youth-affecting austerity policies. Finally, McNeill et al. (2019) examined young women's participation in collaborative, sustainable fashion consumption models and how social connection and self-identity affect consumption behavior.

The literature emphasizes young engagement in sustainable development activities across Europe through education, entrepreneurship, advocacy, and agripreneurship. Youth participation in sustainable development is shaped by critical thinking, new media, and identity formation.

2.8 Research gaps in empowering people in Bioeconomy

The discussion of empowering individuals in a sustainable economy brings to light several research gaps that need to be filled in order to advance the field. As crucial navigational tools for a sustainable future, Stremke et al. (2012) contend that energy landscapes should be conceptualized and constructed to support strategic decision-making in energy planning and resource allocation. They also endorse the application of techniques such as energy potential mapping and multicriteria decision analysis. To effectively tackle intricate energy-related issues and facilitate sustainable energy transitions, it is imperative that multidisciplinary research initiatives incorporating environmental science, policy studies, and geographical analysis be undertaken.

Wu and colleagues (2016) also examine the intricate relationships between social, economic, and environmental concerns as they relate to urban sustainability and the shared economy. Their analysis highlights the critical need for more study subjects that explore the complexities of shared economy activities and their implications for sustainable urban development. Scholars can contribute valuable insights to policy-making and urban planning efforts aimed at promoting more resilient, inclusive, and environmentally sustainable urban environments by analyzing the socio-economic dynamics, governance frameworks, and environmental implications of shared economy initiatives.

Peirson-Smith et al. (2017) highlight the field of sustainable fashion practices, especially in clarifying consumers' understanding of terms used by fashion firms to promote sustainability. Their study highlights a significant void in consumers' comprehension and involvement with sustainable fashion, indicating the necessity for research initiatives that close the knowledge gap between sustainable fashion discourse and consumer behavior. Researchers can provide valuable insights into marketing tactics, supply chain management techniques, and policy interventions that attempt to promote more sustainable consumption patterns within the fashion sector by dissecting the intricacies of consumer attitudes, preferences, and behaviors towards sustainable fashion.

In addition, Higgins-Desbiolles et al. (2018) investigate how restaurants might be transformative in helping to move towards sustainability, with a focus on the Sustainable Development Goals established by the UN. Their analysis highlights how important the hospitality industry is to promoting sustainable behaviors and consumption habits. Researchers can offer useful insights to help industry stakeholders execute successful sustainability strategies and promote more sustainable food systems by dissecting the socio-cultural, economic, and environmental aspects of restaurants' sustainability activities.

Furthermore, Huhmarniemi et al. (2020) highlight the little-known relationship between Arctic arts, culture, and sustainability and call for more study in this field. Their appeal emphasizes how the arts and culture have the capacity to act as significant drivers for community involvement, environmental awareness, and sustainable development in Arctic areas. Researchers can aid in the creation of culturally aware and context-specific sustainability initiatives that connect with local communities and encourage environmental stewardship in Arctic regions by looking at how arts and culture shape narratives, identities, and practices related to sustainability.

2.9 Summary

The bioeconomy has drawn a lot of interest and investment from a variety of sectors as a vital area for advancing sustainability and economic prosperity internationally. Concerns have been raised, nevertheless, regarding how the bioeconomy is understood and applied. Some have cautioned against ignoring opposing viewpoints and seeing the bioeconomy as a technical solution to intricate socioeconomic and environmental problems. National bioeconomy strategies and policies have been greatly influenced by international organizations, most notably the OECD.

The bioeconomy emphasizes forestry as a vital component that contributes to novel forest products, bioenergy, and traditional products alike. Effective resource management is a challenge when forestry is integrated into the bioeconomy. As a result of differing objectives and priorities, different regions prioritize the bioeconomy differently. For example, the production of biofuels in Latin America has contributed to economic growth. The bioeconomy in the US has evolved significantly, and efforts are being made to determine its scope and significance. Political decisions, entrepreneurship, and technological advancement are cited as key factors in the bioeconomy's success. The development of the abilities and information

required for careers connected to the bioeconomy is emphasized as requiring education and training, with a focus on vocational education programs specifically designed for the industry.

The bioeconomy is seen as a revolutionary economic paradigm in Europe, with the goal of encouraging renewable energy sources and lessening environmental damage. Disparities in the processing and production of biomass, however, have sparked concerns about the dynamics of knowledge production and global inequalities in material flows. In the bioeconomy, entrepreneurship is viewed as essential to promoting sustainable change. However, policymakers have come under fire for prioritizing industrial viewpoints over the interests of farmers.

The social and societal aspects of the bioeconomy in Europe have drawn a lot of attention, with research looking at topics including the role of governance in fostering sustainability, gender dynamics in the workforce, and the adaptation of social protection systems. Millions of new employments could be created in the bioeconomy, which is considered as having major job chances for sustainable economic growth in Europe.

It has been determined that education and training are essential for creating human capital and promoting innovation in the bioeconomy. The goal of initiatives centered around sustainable development principles, technology-enhanced learning, and vocational education is to prepare people for careers related to the bioeconomy. Europe's government policies emphasize collaboration between government, academia, and business to encourage eco-friendly, inventive, and sustainable practices across a range of industries.

It is believed that youth participation in sustainable development is essential for tackling global issues, with initiatives aimed at encouraging civic engagement, entrepreneurship, and education among young people. Initiatives utilizing advocacy, entrepreneurship education, and critical thinking are meant to equip young people to contribute to sustainable development.

3. Methodology

This thesis aims to examine the extent of young people's participation in the bioeconomy across Europe using a survey methodology. The study aims to provide information on policy and practice to promote youth participation in sustainable economic activities by examining several aspects of young people's awareness, perspectives, and involvement in the bioeconomy. This section presents a justification for the chosen study design and procedures.

3.1 Research Design

For this study, a mixed-methods survey-based approach that incorporates elements of exploratory and descriptive research was used as the research design. The descriptive portion of the design allows for the methodical collection and analysis of data to provide a comprehensive picture of young people's awareness, perceptions, and involvement in the bioeconomy. Using a standardized survey instrument, the study aims to quantify many aspects of adolescent involvement in sustainable economic activities, providing insights into the extent and nature of their involvement.

Although the study's design is mostly descriptive, exploratory research elements are also included. This opens the possibility of looking at the underlying dynamics and factors that influence the bioeconomy engagement of young people. The study looks at emerging themes, identifies potential areas for additional research, and offers nuanced insights using open-ended and closed-ended survey questions and qualitative data analysis. The study used an exploratory technique to deepen understanding of the several factors that affect youth participation in the bioeconomy.

To fully address the research problems, the mixed-methods approach offers several advantages. The study can capture the range and depth of knowledge on the participation of young people

in the bioeconomy. Structured surveys are an effective way to collect large amounts of data, which makes it easier to analyze the data and identify trends and patterns in the sample. Conversely, participants can express their thoughts and experiences in their own words while answering open-ended questions, which helps us better understand their points of view.

Nonetheless, it is critical to understand the limitations of the research design. Surveys are efficient and can reach many participants, but they may not be as effective in gathering rich qualitative data as more comprehensive methods like focus groups or interviews. In addition, surveys that only use self-reported data may include biases such as social desirability bias or response bias. Despite these limitations, the mixed-methodologies approach is a reasonable and well-balanced technique to look at youth involvement in the bioeconomy.

3.2 Survey Overview

The "Youth Engagement in the Bioeconomy: Opportunities, Challenges, and Perspectives" survey targets European 15–24-year-olds. The survey examines youth bioeconomy awareness, perceptions, and participation. The survey is anonymous to safeguard participants.

The poll includes young bioeconomy engagement in seven sections: Demographic Information, such as age, gender, domicile, work status, and education, is collected; Awareness & Understanding, where the study examines participants' knowledge and understanding of the bioeconomy, as well as their primary sources of information; Perceptions of Bioeconomy, which examines participants' views on the bioeconomy's economic benefits, role in sustainable development, and impact on global environmental challenges; Educational Integration, which assesses participants' perceptions of bioeconomy education, exposure to related courses, and interest in workshops or programs; Job Opportunities and Skills, examining participants' job-seeking behavior, employment prospects, required skills, and perceived challenges in

bioeconomy careers; Government Policies and Support, assessing participants' awareness, effectiveness, and suggestions for improving government activities for youth involvement in the bioeconomy; and Motivation and Participation, which examines participants' bioeconomy interest, future participation likelihood, and sustainability project involvement history.

Before the survey ends, respondents can make comments or suggestions in an optional feedback area. The study aims to provide insight into young people's bioeconomy views and experiences to shape policies and laws to encourage youth participation in sustainable economic enterprises.

Positives of the Survey:

The study addresses a wide range of topics related to young people's involvement in the bioeconomy, including motivation, engagement, awareness, perceptions, and the integration of school and work. This thorough approach guarantees a comprehensive comprehension of the subject. Participants will find it easy to navigate and answer questions because the survey is thoughtfully divided into seven sections. Data collection and analysis are made easier by this grouping.

The survey guarantees geographical variety and a wide representation of youth viewpoints within the region by focusing on young people aged 15 to 24 throughout Europe. By guaranteeing anonymity, the poll promotes truthful answers and lessens response bias. Open communication and honest criticism are encouraged by this secrecy. The survey's completion as a component of a master's thesis project gives the study more academic integrity and legitimacy. It guarantees that academic norms are followed and conveys a scholarly intent.

Negatives of the Survey:

Even with precautions made to ensure anonymity, participants may nevertheless exhibit response bias or social desirability bias, which could lead to inaccurate or skewed responses.

This may affect the reliability and validity of the results. While the survey covers several issues pertaining to youth participation in the bioeconomy, it may not fully address all the nuances or complexities of the topic. Certain facets or points of view that are significant for young involvement can be disregarded. The poll relies on self-reported information from participants, which may be inaccurate or misinterpreted. It is probable that individuals' views or experiences occasionally diverge from the real world. Some participants might find it challenging to communicate in English because the survey is most likely being conducted in that language. Furthermore, because to problems with internet accessibility and survey platform usability, participation may be limited and certain groups may be excluded. Lastly, the survey's inability to track changes or trends in young people's involvement in the bioeconomy over time stems from the fact that it only captures participants' thoughts and experiences at a single point in time.

Potential objectives that can be missed:

Given the poll is most likely conducted in English, some participants could find it challenging to express in that language. Moreover, depending on problems with internet availability and survey platform accessibility, participation may be limited and specific demographics could be omitted. The study is impossible to assess changes or trends in young people's participation in the bioeconomy over time since it just notes participants' thoughts and experiences at one period. Overall, although the survey provides insightful information about young people's involvement in the bioeconomy, these limitations should be addressed to improve the scope and depth of the research findings.

3.3 Data Analysis

After the survey replies are gathered, the information will be carefully examined to extract insightful information about young people's involvement in the bioeconomy. To give readers a thorough grasp of the research issue qualitative methodologies will be used in the analysis. Thematic analysis will be used to find recurrent themes, patterns, and insights in the qualitative data collected from open & close ended survey questions, including participant written responses and feedback. As part of this qualitative analysis, textual data will be categorized into relevant themes or categories according to participant attitudes, recurrent themes, or concepts.

A more thorough examination of participants' viewpoints, experiences, and difficulties about the bioeconomy will be possible thanks to thematic analysis. Through a qualitative analysis of the participant narratives, the research will gather deep, subtle insights that enhance and supplement the results.

3.4 Integration of Findings

This research will create a complete picture of young people's bioeconomy participation. By triangulating data from multiple sources, study conclusions can be more reliable and easily interpreted.

The integrated approach will reveal themes, tensions, and convergences between trends and narratives. By combining quantitative and qualitative data, the study seeks to understand young bioeconomy participation. Overall, the data analysis process will follow stringent methodological requirements to ensure survey results validity, transparency, and reliability. The findings will inform scholarly study, policy and real-world programs that empower adolescents to transition to a sustainable bioeconomy.

4. Results

This thesis's results section offers the results of the survey meant to investigate young people's (ages 15 to 24) place in the bioeconomy. This section seeks to present a thorough analysis of the data gathered, emphasizing significant findings and trends pertaining to young awareness, involvement, and perceptions of the bioeconomy.

The results are arranged in accordance with the primary study topics, which center on employment prospects, the incorporation of education, governmental regulations, and the general involvement of youth in this developing field. This part adds to the larger conversation on youth empowerment and sustainable development by methodically presenting the survey results and providing a thorough grasp of the potential and difficulties experienced by young people in the bioeconomy.

4.1 Demographic Breakdown

In figure 1 & table 1, responses to the survey were gathered from people in the target age range of 15 to 24 years old. This section offers a thorough overview of the respondents' demographic distribution and salient features, broken down into two main age groups: 15–19 and 20–24.

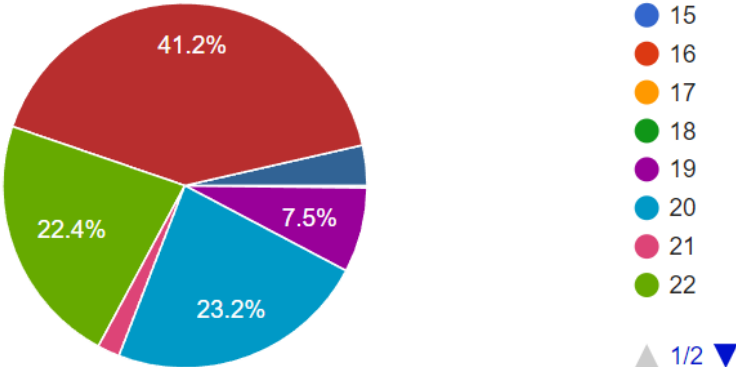


Figure 1: Age Distribution of Survey Respondents

Age Bracket	Frequency	High Awareness	Moderate Awareness	Low Awareness	Percentage of High awareness to total frequency
15-19	39	4	20	17	10.26%
20-24	466	98	285	83	21.03%

Table 1: Age bracket compared with their respondent's level of awareness

Representation Age 15-19

20% of all respondents belong to this category. These individuals are usually freshmen or high school students; however, some may be pursuing early enrollment in college or career training. Most people in this age group are either fresh college graduates or in secondary school. They are probably striking a balance between the prerequisites for general education and the preliminary investigation of interests. Compared to older respondents, their acquaintance with specialist issues such as the bioeconomy may be lower due to their younger age.

This narrow exposure is frequently caused by secondary school curricula, which may not cover specialist subjects like the bioeconomy in detail. Due to their education's continued generality and lack of specialization, participation in bioeconomy-related activities may be restricted. They are frequently involved through extracurricular activities, school projects, or early career training programs. They might have more exploratory goals in mind, such as discovering new areas of study and figuring out possible career routes. Since members of this demographic frequently still define their values and job goals, early exposure to the bioeconomy may have a significant impact on their decision-making in the future.

Representation: Age 20-24

Eighty percent of respondents are in the 20-24 age bracket. These individuals are likely either starting or at the end of their further studies. Those who answer in this bracket frequently work toward graduate or undergraduate degrees, with some having begun their professional careers after completing their studies. Typically, their educational experiences involve more specific coursework and real-world applications associated with their subject areas of study. A deeper comprehension of the bioeconomy is attained through increased exposure to specialized coursework and professional settings.

It is probable that they have come across bioeconomy subjects via advanced classes, seminars, internships, or employment. Because of their advanced education and early stages of their careers, members in this category are more likely to be actively involved in bioeconomy-related activities, such as projects, research, internships, and projects. They might also take part in professional associations, related businesses, or university-led initiatives. They may be driven by a desire to advance their careers, pursue professional growth, and support the creative and sustainable industries. At this pivotal point in their lives, many members of this age group are seeking employment in industries that complement their values and long-term objectives.

4.2 Gender Distribution Results

The gender distribution presented in figure 2 of the survey respondents consists of 51.7% males, followed by 46.9%, diverse population is being represented by a small fraction of less than 1% which goes the same for those who preferred not to say it.

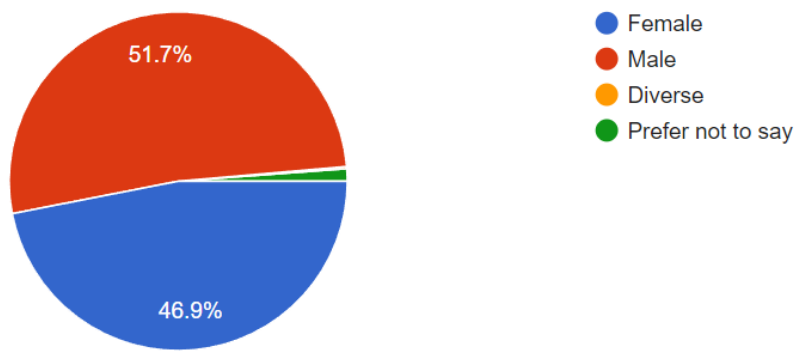


Figure 2: Gender Distribution of Survey Respondents

Analysis

The gender distribution of the survey sample is balanced, with males slightly outnumbering females by about 5%. This suggests that all genders are fairly represented, ensuring that no gender is favored over the other in the survey results. Even if there are relatively few respondents who identify as being diverse or who would prefer not to reveal their gender, their inclusion in the poll demonstrates that diversity and inclusivity were priorities.

4.3 Education Level Analysis

Results of the highest education completed & current pursuits are presented in figure 5 & figure 6 respectively:

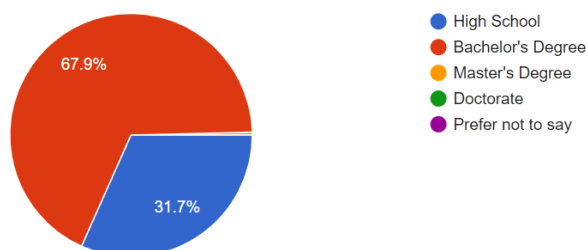


Figure 5: Highest Level of Education Completed by Survey Respondents

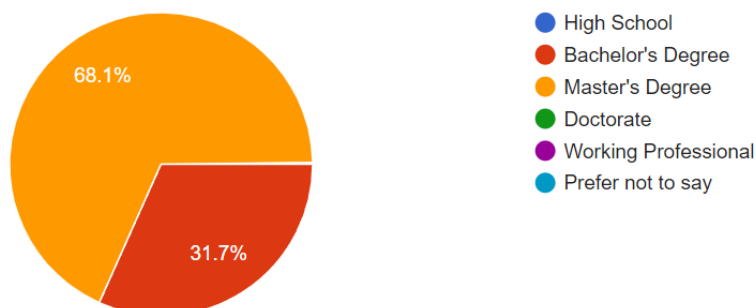


Figure 6: Current Pursuits of Survey Respondents

The highest level of education completed by respondents is as follows: 31.7% have completed high school, 67.9% have a bachelor's degree, 0% have a master's degree, 0% have a doctorate, and 0.4% prefer not to say. Regarding current pursuits, 0% are currently in high school, 31.7% are pursuing a bachelor's degree, 68.1% are pursuing a master's degree, 0% are pursuing a doctorate, 0% are working professionals, and 0.2% prefer not to say.

Education Background of Respondents

1. Completed Education: Completed education data shows that 67 percent of the respondents have earned a bachelor's degree. Only 31.7 percent of the respondents have completed high school. There is either no representation of respondents with master's or doctoral degrees in higher education, or the representation is very minimal.

2. Current Educational Pursuits: Current educational pursuits indicate that the overwhelming majority (68.1%) are presently working toward a master's degree, suggesting a significant

desire to continue their education after completing their undergraduate degree. A third (31.7%) are working toward a bachelor's degree. There are no respondents who identify as working professionals, are pursuing doctorates, or are in high school.

Implications for the Bioeconomy

1. Educational Preparedness: A well-educated demographic is suggested by the large percentage of respondents who are pursuing or have earned Bachelor's degrees, which is helpful for the bioeconomy sector, which frequently needs specialized knowledge and abilities.

2. Focus on Advanced Degrees: A tendency towards higher education is seen in the significant proportion of respondents who are seeking Master's degrees, which may be attributed to the necessity of specialized knowledge in the bioeconomy.

4.4 Results by Country

The poll collected responses from youth in several European nations. In addition to revealing the geographic diversity of the respondents, this section breaks down the data by nation and highlights any noticeable variations in government support for young involvement in the bioeconomy, job prospects, awareness, and educational integration.

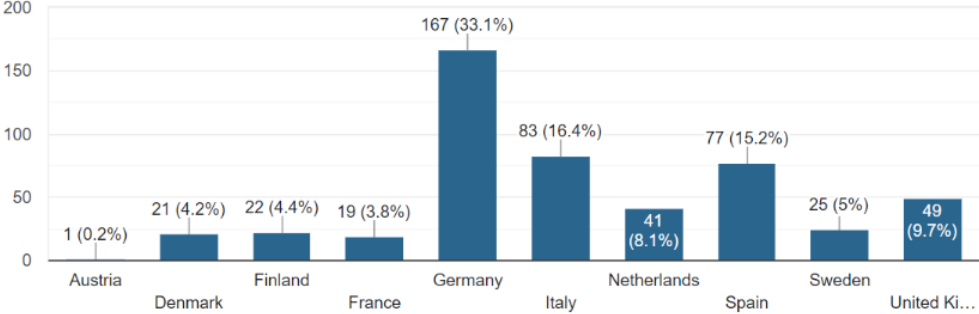


Figure 3: Distribution of responses from different countries

Countries	Frequency	High Awareness	Moderate Awareness	Low Awareness	Percentage of High awareness to total frequency
Germany	167	33	101	33	19.76%
Italy	83	21	47	15	25.30%
Spain	77	15	51	11	19.48%

Table 2: Countries compared with their respondent's level of awareness

Country Distribution

Figure 3 & table 2 describes responses from the following countries:

- **Germany:** 167 (33.1%)
- **Italy:** 83 (16.4%)
- **Spain:** 77 (15.2%)
- **United Kingdom:** 49 (9.7%)
- **Netherlands:** 41 (8.1%)
- **Sweden:** 25 (5.0%)
- **Finland:** 22 (4.4%)
- **Denmark:** 21 (4.2%)
- **France:** 19 (3.8%)
- **Austria:** 1 (0.2%)

4.5 Results of Awareness and Understanding of Bioeconomy

The data presented in figure 7 & table 3 throws light on survey participants' awareness and grasp of the notion of bioeconomy. This is an in-depth examination:

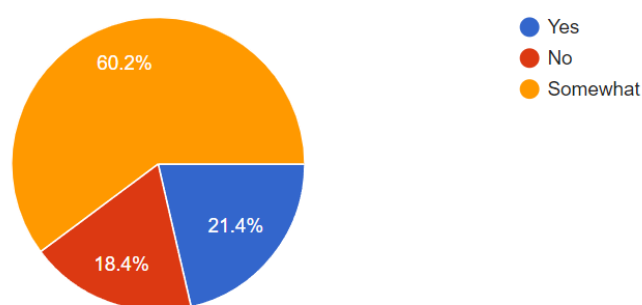


Figure 7: Familiarity with the Phrase "Bioeconomy" Before Survey

Familiarity with the Phrase "Bioeconomy"	Frequency	Very interested	Interested	Not sure	Not interested	Percentage of familiarity to total frequency
Yes	108	28	80	0	0	25.93%
No	93	1	66	2	24	1.08%
Somewhat	304	6	293	0	7	1.97%

Table 3: Familiarity with the Phrase "Bioeconomy" Before Completing the Survey compared with the respondent's interest level

Understanding of the Term "Bioeconomy"

Findings shows that 108 out of 505 respondents, or 21.4% of the sample, said they were aware of the phrase "bioeconomy." Conversely, 93 out of 505 respondents, or 18.4% of the sample, did not know the phrase. Meanwhile, 304 out of 505 respondents, or 60.2% of the sample,

reported knowing the term in some capacity. According to these findings, most respondents (60.2%) were at least somewhat familiar with the phrase "bioeconomy," but only a lesser percentage (21.4%) were entirely familiar. This reveals a lack of general knowledge and comprehension of the term.

Knowledge of the Bioeconomy Concept

On a scale of 1 to 5, with 5 denoting a very high understanding and 1 denoting a very low understanding, participants were asked to score their comprehension of the bioeconomy as presented in figure 8:

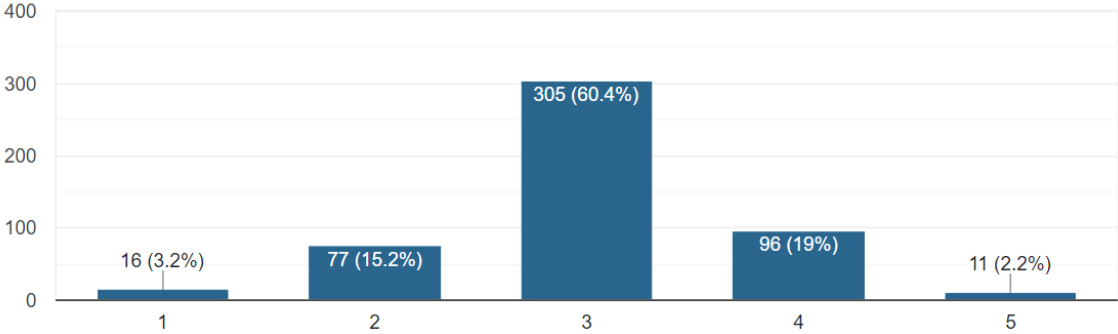


Figure 8: Self-Rated Understanding of the Concept of Bioeconomy (Scale of 1 to 5)

The results were as follows: 1 (Very Low) was scored by 3.2% of respondents (16 out of 505), 2 was scored by 15.2% of respondents (77 out of 505), 3 was scored by 60.4% of respondents (305 out of 505), 4 was scored by 19% of respondents (96 out of 505), and 5 (Very High) was scored by 2.2% of respondents (11 out of 505).

According to the results, a moderate degree of understanding was evaluated by most respondents (60.4%) (3). Merely 3.2% and 2.2% of participants, respectively, assessed their level of understanding as extremely low or high.

Information Sources on Bioeconomy

In figure 9 participants were asked about the sources they use to gather information regarding Bioeconomy. Educational institutions were cited by 451 respondents, or 89.3%, as their main source of information regarding the bioeconomy, suggesting that the dissemination of information in this sector is greatly aided by formal schooling. Social media was identified by 341 respondents, or 67.5%, as their main information source, demonstrating the crucial role of internet channels in raising awareness and engaging young people about bioeconomic issues.

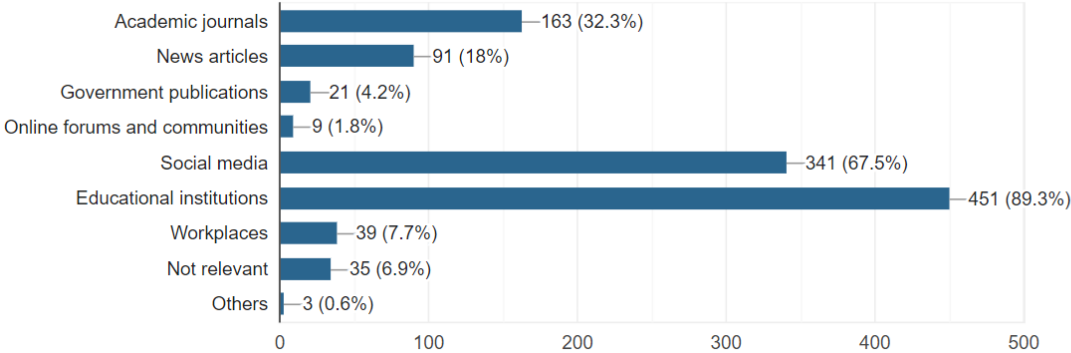


Figure 9: Primary Sources of Information About the Bioeconomy

A considerable dependence on scholarly publications for reliable and in-depth information is shown by the 163 respondents, or 32.3%, who cite academic journals as a source of information. News articles account for 91 respondents' (18%) source of information, implying that, while to a lower degree than academic institutions and social media, mainstream media also aids in the public's awareness of the bioeconomy. Workplaces are relied upon by 39 respondents, or 7.7%, indicating that professional environments and hands-on experience are two ways that some people learn about the bioeconomy. Government publications are a source for 21 respondents, or 4.2%, suggesting that most respondents do not consider official government documents and reports to be their primary source of information. Online communities and forums are used by nine respondents, or 1.8%, indicating a low dependence on peer-to-peer networks for

information sharing. A small percentage of respondents, 35 or 6.9%, said the topic did not apply to them, indicating that they do not actively seek out information regarding the bioeconomy.

4.5.1 Results of Perceptions on the Importance of Bioeconomy for Environmental Challenges and Sustainable Development

The provided infographics in figure 10 shed light on respondents' perceptions of the bioeconomy's importance in addressing environmental issues worldwide and promoting sustainable development.

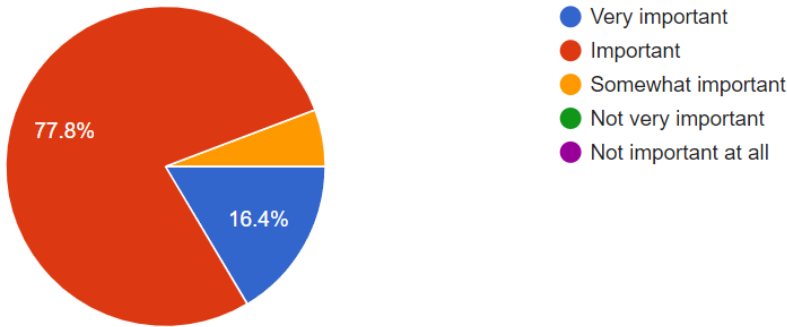


Figure 10: Perceived Importance of the Bioeconomy in Addressing Global Environmental Challenges

The importance of the bioeconomy for addressing global environmental challenges is perceived as follows: According to 83 respondents (16.4%), the bioeconomy is very important for tackling environmental issues around the world. A significant majority, 393 respondents (77.8%), believe that the bioeconomy is important for addressing these issues. According to 25 respondents (5%), the bioeconomy is somewhat important. Only 2 respondents (0.4%) believe the bioeconomy is not very important for environmental issues, and another 2 respondents

(0.4%) believe that the bioeconomy has no bearing on solving the world's environmental problems.

Contribution of Bioeconomy to a Sustainable Development

In Figure 11, participants were asked about their perception of the bioeconomy's contribution to sustainable development.

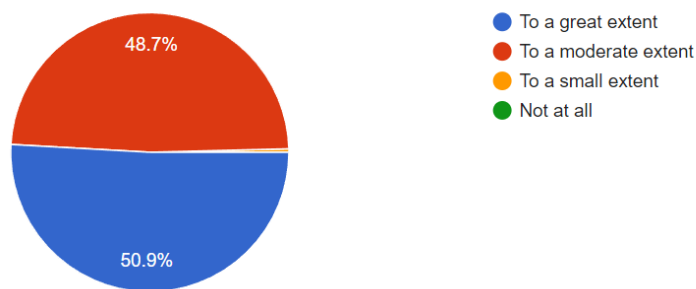


Figure 11: Belief in the Contribution of the Bioeconomy to Sustainable Development

According to 258 respondents (50.9%), the bioeconomy may make a significant contribution to sustainable development. 246 participants (48.7%) believe that the bioeconomy can have a moderate impact on sustainable development. Only one respondent (0.2%) thinks the bioeconomy can somewhat support sustainable development. Notably, no respondents believe that the bioeconomy does not aid in sustainable development at all.

4.5.2 Results of Optimism for Economic Opportunities in the Bioeconomy

The presented figure 12 sheds light on respondents' optimism levels about the bioeconomy's ability to provide young people with access to the workforce. The respondents' individual

economic prospects or benefits are also highlighted in the open-ended responses. A thorough analysis based on the survey replies can be seen below.

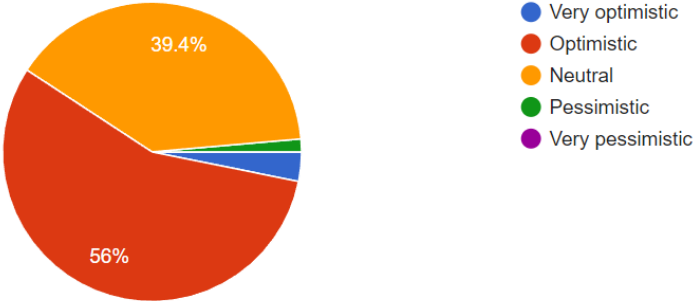


Figure 12: Survey Responses on Optimism About Bioeconomy’s Economic Opportunities for Youth

Feeling positive regarding the bioeconomy's potential, ten respondents (2%) expressed extreme optimism over the bioeconomy's ability to give young people access to the workforce. Additionally, 199 respondents (39.4%) expressed optimism about this potential. Meanwhile, 283 respondents (56%) are unconvinced that the bioeconomy will generate new business prospects. Ten respondents (2%) expressed pessimism regarding the possibilities, and three respondents (0.6%) expressed extreme pessimism.

Specific Economic Opportunities Envisioned

The survey participants' open-ended answers indicate a range of economic opportunities and advantages they believe the bioeconomy will provide to youth in the future. These include the creation of healthy, non-toxic food sources that are manufactured artificially, as well as opportunities for eco-friendly travel that emphasize environmentally friendly and sustainable modes of transportation. Learning opportunities are provided by the addition of new courses that improve knowledge and skills in the bioeconomy.

The creation of economically and environmentally sound sustainable jobs is also highlighted. Innovations that promote a circular economy by reducing trash output and initiatives and jobs designed to cut CO2 emissions to mitigate the effects of climate change are seen as significant opportunities. Broad prospects for expansion across the bioeconomy's sectors that promote economic growth and an increase in the number of jobs available in the bioeconomy's many sectors are also envisioned.

4.5.3 Findings of Educational Integration in the Bioeconomy

Figure 13 shed light on the status of educational integration with respect to the bioeconomy, including exposure to learning resources outside of the traditional classroom and the suitability of educational institutions' preparation for jobs in this industry. A thorough analysis based on the survey replies can be seen below.



Figure 13: Exposure to Bioeconomy Educational Resources Outside Formal Schooling

Exposure to Educational Materials Outside Formal Schooling

Exposure to educational materials outside formal schooling was reported as follows: Two percent of the respondents, or ten individuals, said they have taken part in workshops or online courses on the bioeconomy. Of the 100 respondents, 19.8% said they had come across online educational resources about the bioeconomy. A majority, 386 respondents (76.4%), said they

have not come across any instructional resources about the bioeconomy outside of formal education. Nine respondents (1.8%) thought the question was irrelevant or preferred not to respond.

Adequacy of Educational Preparation

Figure 14 highlights respondents' perceptions regarding the adequacy of educational preparation for professions in the bioeconomy.

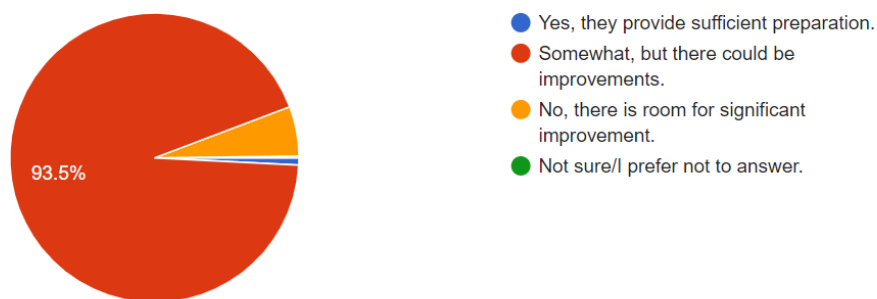


Figure 14: Perceptions of Educational Institutions' Preparation for Bioeconomy Careers

Of the respondents, six (1.2%) think that schools adequately prepare students for professions in the bioeconomy. Although there is some preparation, 472 respondents (93.5%) believe there is still much room for improvement. According to 27 respondents (5.3%), there is a significant need for change in the way educational institutions educate students for professions in the bioeconomy. Notably, no respondents were unsure or preferred not to respond.

4.6 Results of Interest and Employment in the Bioeconomy

Figure 15 provided offer insights into the interest in educational programs and the active search for employment opportunities in the bioeconomy sector. Here is a detailed analysis based on the survey responses.

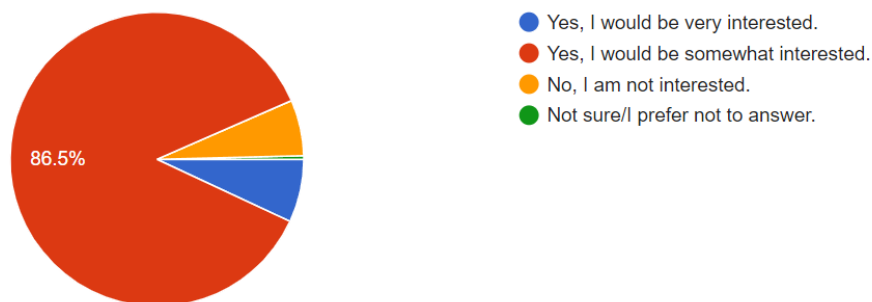


Figure 15: Interest in Bioeconomy-Related Educational Programs and Workshops

Interest in Bioeconomy-Related Educational Programs or Workshops

The following was reported as interest in seminars or educational programs pertaining to the bioeconomy: Ninety-nine percent of the respondents indicated a great desire to take part in these workshops or events. 437 respondents, or 86.5% of the sample, said they would be somewhat interested. On the other hand, 15% of the respondents expressed no desire to take part in these workshops or activities. Furthermore, three respondents (0.6%) said they were unclear or would have preferred not to respond.

Search for Employment Opportunities in the Bioeconomy Sector

The number of respondents who looked for work in the bioeconomy industry is shown in Figure 16.

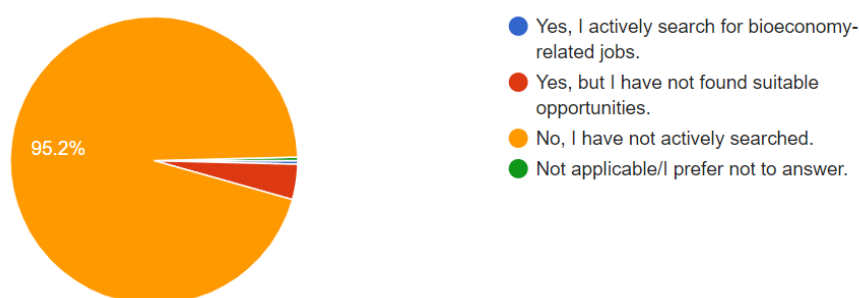


Figure 16: Active Search for Employment Opportunities in the Bioeconomy Sector

Merely 15% of the participants are actively seeking work in the bioeconomy industry. Despite their searches, nine respondents (1.8%) have not come across any prospects that seem right. 481 respondents, or 95.2%, indicated that they have not actively looked for work in the bioeconomy industry. Remarkably, neither the not applicable nor the preferred not to answer options were chosen by any responders.

4.6.1 Findings of Factors Considered When Evaluating Job Prospects in the Bioeconomy

Several factors that participants consider while evaluating job prospects in the bioeconomy sector are shown in Figure 17.

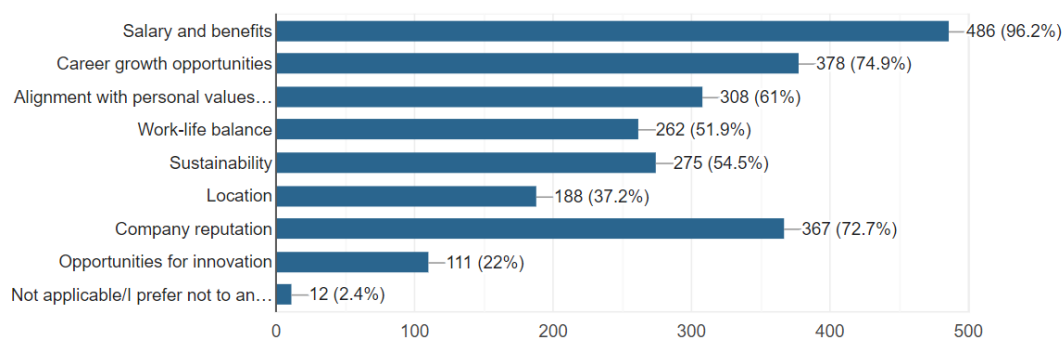


Figure 17: Factors Considered When Evaluating Job Prospects in the Bioeconomy

Salary and perks are the most important variables, according to a thorough analysis of the survey data, with 96.2% of respondents (486 people) saying that money has a big influence on their employment decisions. The significance of financial factors in assessing employment chances is highlighted by this high percentage.

prospects for career progress are also important; 74.9% of respondents (378 people) valued jobs that provided prospects for long-term professional development and advancement. This shows

that those who responded are drawn to jobs that offer the chance to advance their careers and develop their skills. For thirty-eight people, or sixty-one percent of respondents, it is crucial that a job match their interests and values. This emphasizes how important it is to have a fulfilling career and personal life, since many people look for jobs that align with their values and interests.

A healthy balance between personal and professional life is deemed necessary by 51.9% of respondents (262 persons) who viewed work-life balance as crucial. It is clear from this that they prefer jobs that do not interfere with their personal lives and do not put too much strain on them at work. Environmental and social sustainability is favored by 54.5% of respondents (275 people), making sustainability another important consideration. This goes hand in hand with the larger objectives of the bioeconomy and shows a strong willingness to work for organizations that value environmental responsibility. Regarding living conditions, commute times, or local opportunities, 37.2% of respondents (188 people) stated that location is a significant aspect. This implies that choices and inclinations about jobs may be influenced by location variables.

A company's reputation is important to 72.7% of respondents (367 people), underscoring the significance of an employer's brand value, ethics, and perceived stability. When assessing career chances, respondents' opinions are obviously impacted by the company's general reputation. 22% of respondents, or 111 people, said they value opportunities for innovation. The availability of creative and inventive work environments is nevertheless crucial for those interested in careers like these, even though it is not as important as other aspects. In conclusion, 12.4% of the participants opted not to provide a response or deemed these variables insignificant, maybe indicating unique personal situations or privacy apprehensions. This

shows that although these factors are generally significant, not every survey responder may experience them.

4.6.2 Analysis of Skills and Challenges in Bioeconomy Careers

Based on responses from 505 survey participants, Figure 18 describes the main barriers that young people may encounter while pursuing professions in the bioeconomy and the knowledge and skill sets that are necessary for success in this field.

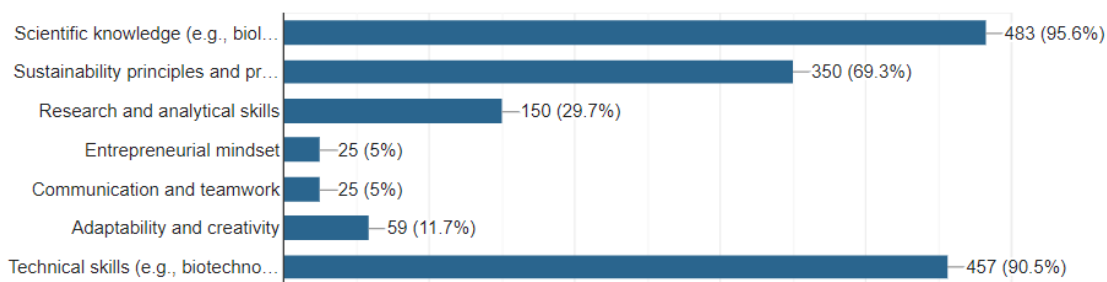


Figure 18: Key Skills and Knowledge for Success in Bioeconomy Careers

Key Skills and Knowledge Areas

The greatest necessary skill set for success in the bioeconomy is scientific knowledge, as indicated by 95.6% of respondents (483 people). This emphasizes how successful employment in this field requires a strong foundation in pertinent scientific fields. Technical abilities are also very important, according to 90.5% of respondents (457 people). Technical competence is highly valued, which emphasizes the importance of having knowledge of biotechnology and bioengineering processes, which are essential for employment in the bioeconomy.

A total of 350 respondents, or 69.3%, believe that it is crucial to understand sustainability ideas and practices. Working in this field requires having a thorough understanding of sustainability concepts because sustainable development and the bioeconomy are closely related. According

to 29.7% of respondents (150 people), research and analytical abilities are essential for the bioeconomy. To perform scientific study, analyze data, and solve challenging issues in the field, these abilities are essential.

Adaptability and creativity, though less frequently highlighted, are nevertheless important, with 11.7% of respondents (59 individuals) noting their significance. These soft skills are valuable for fostering innovation and navigating the ever-evolving landscape of the bioeconomy. An entrepreneurial mindset is valued by 5% of respondents (25 individuals), particularly in relation to initiating new projects and ventures within the bioeconomy. This mindset is crucial for those looking to create and lead new business opportunities in the sector. Finally, communication and teamwork are also considered essential, with 5% of respondents (25 individuals) emphasizing their importance. Effective communication and collaboration are necessary for interdisciplinary work and successful project execution in the bioeconomy.

Overall, the survey results illustrate a comprehensive set of skills and knowledge areas crucial for success in the bioeconomy, with a strong emphasis on scientific and technical expertise, alongside an appreciation for sustainability, research capabilities, and soft skills such as adaptability and communication.

4.6.3 Key Challenges in Pursuing Bioeconomy Careers

Individual responses that emphasize the difficulty of new entrants adopting sustainable practices due to current structures' partial alignment with sustainability goals highlight one of the main obstacles to pursuing careers in the bioeconomy: deeply ingrained systems that are not oriented towards sustainability. Significant obstacles are those related to intellectual property and regulations; specific answers point out that they can obstruct innovation and the venture capitalization of novel ideas. One other noteworthy difficulty is competitiveness. According to

several respondents, young professionals find it challenging to secure employment due to the competitive nature of the field.

A lack of job availability, as reported by individuals, presents a major obstacle for recent graduates and young professionals. Furthermore, many youths lack the requisite knowledge and skills, according to individual responses, which impedes their ability to pursue or succeed in bioeconomy careers. Lastly, low motivation among some young people, as noted in the responses, contributes to the challenge of engaging in this sector. These individual insights collectively underscore systemic, regulatory, and personal barriers affecting youth involvement in the bioeconomy.

4.7 Findings of Government Initiatives and Policies in Promoting Youth Participation in the Bioeconomy

Awareness of government activities and the effectiveness of government policies in promoting youth participation in the bioeconomy were explored through the analysis of survey responses from over 500 participants, as shown in Figure 19 and Figure 20.



Figure 19: Awareness of Government Initiatives Supporting Youth in the Bioeconomy

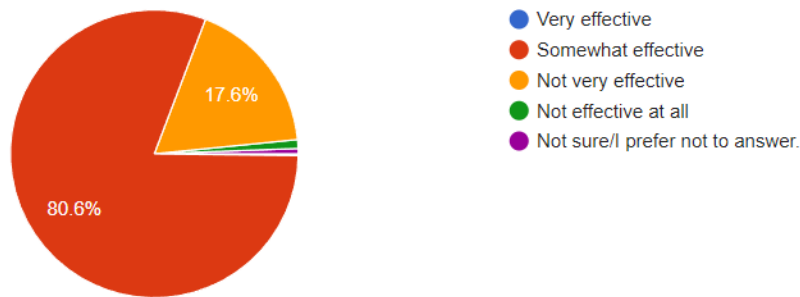


Figure 20: Perceived Effectiveness of Government Policies in Promoting Youth Participation in the Bioeconomy

In terms of awareness of government programs, most respondents (96.6%) indicated that they were not aware of any government campaigns or programs aimed at promoting youth engagement in the bioeconomy, with only 0.2% reporting awareness and 3.2% unsure or preferring not to answer. Regarding the effectiveness of government policies, the responses were predominantly critical, with no respondents rating the policies as 'very effective'. Only 17.6% of respondents thought they were 'somewhat effective', while 80.6% thought they were 'not very effective' and 1.2% thought they were 'not effective at all', with a minimum of 0.4% unsure or choosing not to answer. These findings suggest a general lack of awareness and perceived effectiveness of government efforts to promote youth engagement in the bioeconomy.

4.7.1 Analysis of Support and Resources for Encouraging Youth Engagement in the Bioeconomy

Figure 21 highlights the survey responses about the kinds of resources and support that would motivate more youth to participate in bioeconomy-related activities.

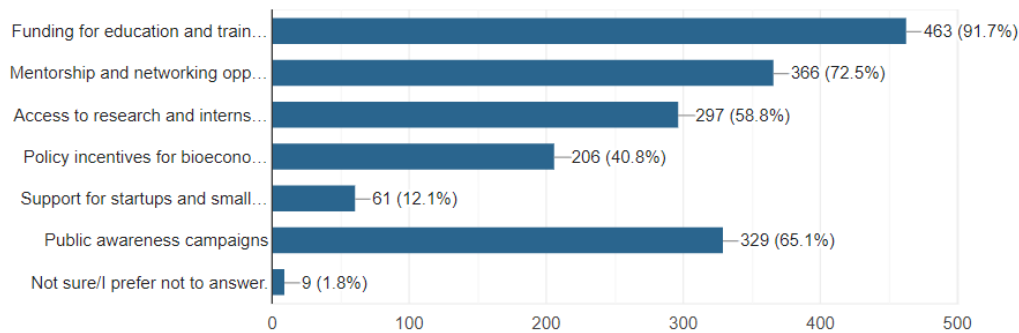


Figure 21: Preferred Support and Resources to Encourage Youth Engagement in Bioeconomy Activities

The overwhelming majority of respondents (91.7%) think that to encourage young participation in the bioeconomy, money for education and training is essential. This suggests that to enable access to pertinent educational programs and skill development, there is a clear need for financial support. More than two-thirds of participants (72.5%) emphasize the value of networking and mentoring, implying that getting advice from seasoned experts and having the opportunity to network with others in the field are highly appreciated.

Access to research opportunities and internships is emphasized by more than half of the respondents (58.8%), who consider engaging in bioeconomy projects and gaining practical experience as essential elements of professional preparation. A sizable portion of respondents (40.8%) thinks that more young people would be encouraged to pursue employment in the bioeconomy if legislative incentives were aimed at these fields, such as grants, tax breaks, or other forms of official assistance. Support for startups and small businesses is still important, according to 12.1% of respondents, although being less important than other forms of support. This suggests that young innovators in the bioeconomy require access to resources and business possibilities. Campaigns for public awareness are crucial, according to 65.1% of participants, who believe that making the bioeconomy and its job opportunities more widely known could

draw more young people to the field. Regarding the kinds of support required, a tiny percentage of respondents (1.8%) either do not know or would rather not comment.

4.8 Analysis of Motivation and Engagement in the Bioeconomy

Figure 22 highlights the motivations for engagement in the bioeconomy as presented below:

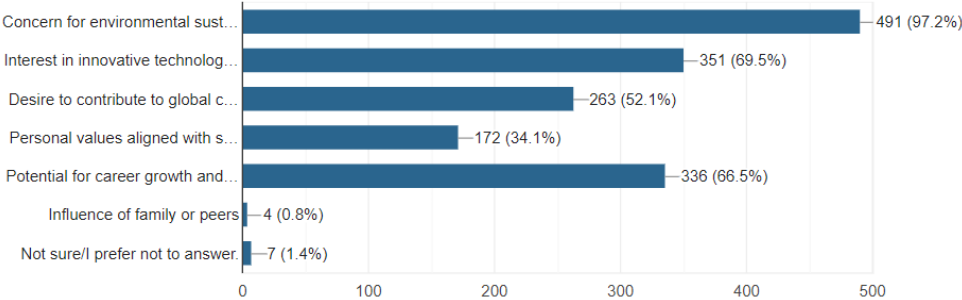


Figure 22: Motivations for Learning About the Bioeconomy and Pursuing a Career in the Field

Many responders (97.2%) are driven by a concern for the sustainability of the environment, demonstrating how important environmental concerns are in generating awareness of and participation in the bioeconomy. It implies that programs emphasizing sustainability are likely to have a significant impact on youth. An interest in cutting-edge technologies motivates a sizable portion of participants (69.5%), suggesting that young people are primarily drawn to technical breakthroughs and the bioeconomy's potential for innovation. More than half of the participants (52.1%) indicate a willingness to assist in resolving global issues, showing that many young people are motivated by a sense of purpose and a desire to use their employment to have a significant impact on the world.

A smaller but statistically significant portion of respondents (34.1%) are driven by sustainability-related personal values, implying that those who value sustainable behaviors in

their daily life are attracted to the bioeconomy. Of the responders, 66.5% are motivated by the possibility of job advancement and prospects, emphasizing the value of opportunities for professional progress and the industry's apparent stability and room for expansion. Just 0.8% of respondents said they are influenced by classmates or family, suggesting that social or familial pressures are not very significant in encouraging young people to work in the bioeconomy. Finally, 1.4% of respondents say they are not sure or would rather not respond, implying that although most participants have clear motives for engaging in the bioeconomy, a small percentage are unsure or prefer to keep their motivations private.

4.9 Analysis of likelihood of Future Engagement in the Bioeconomy

figure 24 highlights the likelihood of future engagement in bioeconomy activities among respondents.

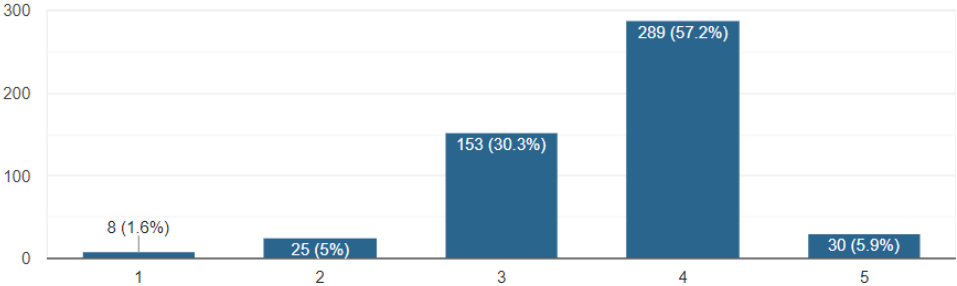


Figure 24: Likelihood of Future Engagement in Bioeconomy-Related Activities

A small but notable portion, representing 5.9% of respondents, are highly likely to become involved, showing their strong enthusiasm for advancing bioeconomy projects. Over half of the participants, specifically 57.2%, expressed a very high likelihood of future participation, reflecting robust interest and potential for growth in this field. A sizable percentage, 30.3%, are moderately likely to engage, indicating that with the right incentives and support, many of these individuals could be encouraged to become more involved. Only 5% of respondents are neutral

about their future involvement, suggesting that targeted educational efforts and inspiration might increase their likelihood of participation. Very few, at 1.6%, said they are unlikely to participate, which points to either a minimal existing interest or potential barriers that need to be addressed to improve engagement.

5. Discussions

This thesis's discussion part attempts to provide an interpretation of the study's findings by evaluating them critically considering previous research in the subject and making connections between the findings and the theoretical framework. The survey results yielded insightful information about the drivers behind young people's involvement in bioeconomy-related activities, as well as the kinds of support they believe are essential. This section will highlight both the similarities and differences between these results with the body of literature, providing a thorough overview of the current situation and suggesting directions for further study and policy formation.

5.1 Implications for Bioeconomy Engagement and Education

The survey's results point to several important areas for advancement and development in the bioeconomy. This part will go over the value of targeted outreach, the need for educational programs, and how to make the most of respondents' moderate awareness of bioeconomy principles. We can gain a better understanding of how to increase public awareness of and participation in the bioeconomy by addressing these issues.

1. Educational Initiatives Needed: Given that just a tiny portion of respondents evaluated their understanding as extremely high, the statistics point to the need for educational programs to improve understanding of the bioeconomy. Education resources, workshops, and awareness campaigns could all contribute to a greater public knowledge and comprehension of the bioeconomy.

2. Targeted Outreach: Targeting individuals with a modest level of familiarity or comprehension will help them become more knowledgeable and involved. To increase the

number of people who are well-informed about the bioeconomy, it is also essential to fill in the knowledge gaps for those who have little to no experience.

3. Utilizing Moderate Understanding: The majority's modest degree of comprehension can be used as a starting point for more extensive educational initiatives. Enhancing understanding of bioeconomy topics could be facilitated by engaging in interactive and hands-on learning experiences.

5.2 Comparative Analysis of Literature Review and Results

It is crucial to compare the survey results to the previous studies that were emphasized in the literature review to fully evaluate the results. This comparison offers a thorough grasp of the status of bioeconomy participation and its educational consequences by critically evaluating the similarities and contrasts between the study's findings and those established in the field.

Educational and Vocational Training

The significance of educational programs to create a greater understanding of the bioeconomy is emphasized in both the literature review and the outcomes section. The literature review highlights international efforts in education, with an emphasis on career training and the acquisition of skills relevant to the bioeconomy. In line with this, the discussion section emphasizes the practical need for improved courses, workshops, and other materials to advance awareness of the bioeconomy in particular nations.

In terms of similarity a recurrent subject in both parts is the urgent need for educational programs. Both emphasize how crucial it is to include bioeconomy concepts in school curricula to have a workforce that is informed and skilled. On the contrary the discussion portion is more focused on the unique requirements found in the survey, especially in Germany, Italy, and

Spain, whereas the literature review offers a wider perspective on international educational activities. This suggests tackling educational inequalities in a more regionally focused manner.

5.3 Government Policies and Support

Both the literature review and the discussion part acknowledge the significance that government support plays in advancing the bioeconomy. The literature review talks about how important it is for governments to support the expansion of the bioeconomy and encourage sustainable practices. The discussion part highlights the influence of government support on youth engagement and job market understanding, even though it does not go into detail about specific government initiatives because young people do not know about them.

The relevance of government measures in promoting bioeconomic growth is acknowledged in both sections. The discussion's findings on the effectiveness of government support in the surveyed countries align with the literature review's emphasis on policy-driven bioeconomic growth. The difference occurs when the discussion part does not specifically address the criticism of European bioeconomy policies in the literature review, which is centered on their industrial orientation and exclusion of farmers. Furthermore, rather than going into detail about specific government programs, the discussion section concentrates on poll respondents' assessments of the usefulness of government assistance. To provide a more inclusive approach to bioeconomy promotion, this points to a possible area for more research or policy recommendations.

5.4 Young People's Optimism and Engagement in the Bioeconomy

Table 4 illustrates the relationship between young people's expectation of actively participating in bioeconomy-related activities in the future and their optimism regarding the bioeconomy's ability to generate economic opportunities.

Optimism About Bioeconomy to Create Economic Opportunities	How likely are you to actively engage in activities or projects related to the Bioeconomy in the future?				Percentage of High awareness to total frequency
	Frequency	High Engagement	Moderate Engagement	Low Engagement	
Very Optimistic	16	16	0	0	100.00%
Optimistic	283	208	67	8	73.50%
Neutral	199	95	84	20	47.74%
Pessimistic	7	0	2	5	0.00%

Table 4: Optimism About Bioeconomy to Create Economic Opportunities compared with how likely are you to actively engage in activities related to Bioeconomy

The following succinct summary of the main findings: Optimism regarding the bioeconomy's potential and the probability of actively participating in bioeconomy-related activities are strongly positively correlated. Young people are more inclined to engage in pertinent activities if they have a positive outlook on the economic opportunities that the bioeconomy presents. Impact of Education has a big say in how this involvement and optimism are shaped. Individuals who have received more education in bioeconomy-related professions exhibit greater optimism and engagement.

Comparison with Existing Literature

While the literature analysis highlights the bioeconomy's potential for innovation and sustainable growth, it also cautions against the possibility that it could be viewed as only a technical fix for socioeconomic and environmental issues (McCormick et al., 2013). This is supported by Table 4's findings, which demonstrate that optimism—which can be fueled by a holistic understanding—increases involvement and demonstrates that young people are able to see beyond the specifics to more expansive socioeconomic potential.

Technological, Entrepreneurial, and Political Viewpoints: Backhouse et al. (2022) talk about how important it is to lessen environmental effects while encouraging structural and technological changes in the bioeconomy. Table 4's positive association raises the possibility that such political and technological developments have an impact on the optimism of young people. This confirms the claims made in the literature to the effect that positive impressions and involvement are fueled by policy and technology innovation.

Opportunities for Employment in the Bioeconomy: The European Commission and Sadhukhan et al. (2016) point out that the bioeconomy has the potential to generate millions of new employments. The relationship between optimism and involvement in Table 4 may be influenced by these alleged career chances. This supports the idea put forth in the literature that the bioeconomy can greatly boost employment and economic growth.

In terms of differences, while Table 4 offers a more general link without going into such details, previous research has occasionally offered a deeper examination of elements (such as gender dynamics or job responsibilities).

5.5 Beliefs about Bioeconomy's Potential and Government Policy Effectiveness

Table 5 examines the relationship between respondents' opinions of the efficacy of government policies in encouraging young participation in the bioeconomy and their views of the bioeconomy's capacity to contribute to sustainable development. The principal conclusions are:

To what extent do you believe the Bioeconomy can contribute to sustainable development?	How effective do you think government policies are in promoting youth participation in the Bioeconomy?						Percentage of somewhat effective to total response
	Frequency	Very Effective	Somewhat Effective	Not very effective	Not sure / prefer not to say	Not Effective	
Great Extent	257	1	228	25	1	2	88.72%
Moderate Extent	246	0	179	63	1	3	72.76%
Small Extent	2	0	0	1	1	0	0.00%

Table 5: Extent to which respondents believe bioeconomy can contribute to a sustainable development compared with how effective respondents think government policies are in promoting youth

Positive Correlation: Perceptions of the efficacy of policies and convictions on the bioeconomy's potential for sustainable development are strongly positively correlated. People who think positively about the bioeconomy are more likely to think that government initiatives to encourage young engagement are working. Impact of knowledge and Awareness: Higher levels of knowledge and awareness regarding the bioeconomy are linked to more positive opinions of policy efficacy and more robust convictions about its promise. Community and Societal Support: Views of government policies and attitudes toward the bioeconomy are greatly influenced by societal and community support.

Comparison with Existing Literature

The literature emphasizes the bioeconomy's contribution to sustainable growth. The results shown in Table 5 lend support to this notion by demonstrating a positive correlation between strong beliefs in the bioeconomy's potential and good evaluations of policy efficacy. This suggests that people are aware of the bioeconomy's wider socio-economic benefits.

Backhouse et al. (2022) stress the significance of technological innovation and policy in the bioeconomy. Table 5's positive association indicates that these developments have an impact on how effective policies are seen, which is consistent with research linking improved public perceptions and technology advancements. The importance of education and involvement in sustainable development is covered by Barth et al. (2008) and Strachan (2018). These opinions are supported by Table 5's findings, which demonstrate that favorable attitudes toward policies and beliefs are essential for young people to get involved in the bioeconomy.

Multidisciplinary research and strategic decision-making are essential, as noted by Stremke et al. (2012) and Wu et al. (2016). The results presented in Table 5 indicate that beliefs and perceptions are more positive in environments with defined infrastructure and support, suggesting the need for continued strategic investment and study.

5.6 Disparities and Challenges

Both the literature review and the discussion part acknowledge the difficulties facing the bioeconomy industry. The literature study highlights the need for inclusive methods, global inequities, and imbalances in the flow of materials. Knowledge and job market awareness gaps are highlighted in the discussion section, with a focus on the nations included in the poll.

Both parts recognize that the bioeconomy sector faces substantial obstacles. The highlighting of gaps in education and employment in the debate is consistent with the literature review's recommendation for all-encompassing approaches to solve these problems. However, the discussion section makes less of a case for inclusive policymaking and global inequities than the literature review does. The conversation focuses more on regionally specific, doable answers to problems with employment and education in the nations under study.

Different Findings and Their Possible Reasons

- 1. Survey-Specific Insights:** Regional variations in bioeconomy development and awareness are reflected in the insights obtained from the survey data, which might not be covered in more general literature.
- 2. Practical vs. Theoretical Focus:** The literature review covers worldwide trends and broader theoretical issues, while the discussion portion focuses on the practical consequences and urgent educational needs found in the survey. This discrepancy can result from the survey's particular scope and methodology.

5.7 Implications for Bioeconomy Education and Outreach

Although many young people have a basic understanding of the bioeconomy, the analysis shows that there is still much room for development in terms of awareness and comprehension. The main conclusions and their implications are summed up as follows: Although few respondents have a thorough understanding of the bioeconomy, the majority have heard of it, indicating a broad basic awareness.

Most people report having a moderate understanding, which implies that additional in-depth instruction is still required even though some basic concepts may be understood. There is a clear need for improved education and outreach strategies to deepen the understanding of the bioeconomy among young people. These findings emphasize the value of focused educational programs and outreach campaigns to promote a more thorough comprehension of the bioeconomy, which is necessary to get young people interested in this important industry.

5.7.1 Implications for Bioeconomy Communication Strategies

The substantial reliance on educational institutions emphasizes the need for bioeconomy issues to be included in school and university curricula. Educational programs should continue

highlighting and delving further into the bioeconomy to ensure that students have a complete understanding of it. Because of this heavy reliance, it is also essential to use social media channels for effective outreach and communication. Young people's wide use of social media should be taken advantage of when developing educational programs, informative materials, and engagement strategies.

The use of academic journals suggests that there is a demand for scholarly information that is clear and easy to read. There should be an attempt to close the knowledge gap between technical academic research and information that is accessible to a wider audience. News stories are a useful tool for spreading information, therefore working with media sources can assist increase public knowledge of the bioeconomy. The public can be informed about advancements and prospects in the bioeconomy through regular features, opinion articles, and news items. The importance of industrial alliances and workplace learning initiatives is highlighted by the distribution of information in professional contexts. Encouraging businesses to offer resources and training related to the bioeconomy can improve understanding and application in practical settings.

Governments can enhance the usability and visibility of their publications by streamlining presentations and improving dissemination methods. Online communities and forums, although not heavily used, offer opportunities for discussion and peer learning. Developing and promoting online communities centered on the bioeconomy can foster greater communication and information exchange among interested parties.

5.8 Importance for Environmental Challenges

The bioeconomy is regarded as being very important or important by most respondents (94.2%) in tackling global environmental concerns. This suggests that young people are very conscious

of the bioeconomy's potential to reduce environmental problems. Given the high degree of perceived relevance, there may be room for educators, legislators, and advocates to further highlight the advantages of the bioeconomy for environmental sustainability. This view can be strengthened by developing focused educational initiatives and campaigns that feature real-world examples and success stories. There is probably a lot of public support for initiatives that advance the bioeconomy because of the broad acknowledgement of its significance.

With the help of this backing, decision-makers can develop and implement bioeconomic programs. About sustainable development, most respondents (99.6%) believe that the bioeconomy contributes either significantly or somewhat. The importance of the bioeconomy is seen in this agreement as being crucial to achieving sustainability goals. Given that the bioeconomy is recognized as having the potential to support sustainable development, it is imperative that it be thoughtfully integrated into larger sustainability frameworks and policies. Cooperating with the Sustainable Development Goals (SDGs) can help stakeholders maximize the impact of bioeconomic operations. Engaging young responders is vital, as seen by their strong belief in the bioeconomy's role in sustainable development. Teenagers' energy and creative ideas can be tapped into via programs that include them in bioeconomic initiatives and decision-making processes.

5.9 Implications for Educational and Employment Strategies

Interest in Educational Programs

High Interest Levels: A resounding majority of respondents (86.5%) said they would be at least somewhat interested in taking part in workshops or educational programs pertaining to the bioeconomy. Furthermore, 9.9% showed a high level of interest. This indicates that there is a considerable need for bioeconomy education programs. Those asked, only 3% expressed no

interest in taking part in these kinds of programs, suggesting that there is not much of a backlash against bioeconomy instruction.

Employment Opportunities: A vast majority (95.2%) of respondents have not actively searched for employment opportunities in the bioeconomy sector. This could be due to a lack of awareness, perceived lack of opportunities, or other barriers. Among the small group actively searching for jobs in the bioeconomy, 1.8% have not found suitable opportunities, indicating a potential mismatch between job availability and the skill sets or expectations of job seekers

Considering the great degree of interest, additional bioeconomy-related programs and workshops ought to be created and offered by educational institutions and policymakers. These must be easily accessible, extensively advertised, and tailored to the requirements and interests of possible participants. Educational programs ought to incorporate career guidance elements that educate students about the several career pathways in the bioeconomy, how to locate job openings, and what qualifications are necessary. Identifying the different kinds of employment that are available, the skills needed, and the gaps in supply and demand can be achieved by performing a complete analysis of the bioeconomy job market.

By using this data, educational programs may be adjusted to better prepare students for the possibilities that will come their way. Forming alliances between academic institutions and businesses involved in the bioeconomy can help students get access to internships, jobs, and hands-on training. This has the potential to close the skills and job gaps. By educating the public about the bioeconomy and the possible career opportunities it presents, job fairs, information sessions, and campaigns can inspire a greater number of people to actively seek work in this field.

6. Conclusion

This study investigated the opportunities and difficulties that young people (those between the ages of 15 and 24) had as they tried to participate in the shift to a bioeconomy. Understanding their awareness levels, readiness for school, employment prospects, and the impact of governmental programs were the main goals of the study.

The study emphasized many avenues for youth involvement in the bioeconomy, such as expanding employment prospects in the biotechnology, sustainable agriculture, and renewable energy industries. A favorable climate for youth participation is created in nations like Germany, which have strong government support and well-integrated bioeconomy subjects in their curricula. On the other hand, difficulties include disparities in awareness, uneven integration into schools, and inadequately focused government programs, especially in nations like Italy and Spain. These results are consistent with previous studies that highlight the need for institutional support and focused educational initiatives to improve young engagement in the bioeconomy (Pubule et al., 2020).

The bioeconomy's job market has a lot of promise, and respondents in Germany demonstrated a thorough awareness of available jobs. Jobs in the bioeconomy are becoming more and more popular in Italy, Spain & other European countries, particularly in biotechnology and sustainable agriculture. Higher educated respondents, however, typically have greater career prospects and market knowledge, indicating the need to more easily accessible vocational and training programs to close this gap. This bolsters earlier research emphasizing the vital role education plays in generating employment prospects in the bioeconomy (Paris et al., 2023).

The results show that young people in Europe have differing degrees of understanding regarding the bioeconomy. Germany demonstrated the highest level of awareness, probably because of strong national regulations and extensive instructional programs. Spain and Italy

demonstrated a reasonable level of awareness, with younger people showing a growing interest. These findings are in line with the body of research that emphasizes how crucial national policies and educational programs are in determining awareness levels (keOrozco-Messana et al., 2020)

Support from the government is essential for promoting young involvement in the bioeconomy. While there is support for young people's involvement in Germany's large government programs, some respondents feel that more targeted initiatives are necessary in Italy and Spain. This result is consistent with the body of research highlighting the role that policies play in advancing the bioeconomy and guaranteeing young engagement that is inclusive (European Commission, 2018).

All things considered, the research emphasizes how important it is for government policies, awareness, education, and employment opportunities to support young people's engagement in the bioeconomy. The results emphasize that to empower youth and fully utilize their potential in spearheading the shift to a sustainable bioeconomy, there is a need for improved educational integration, focused government activities, and raised awareness. To promote a more inclusive and sustainable future, politicians, educators, and business stakeholders can benefit greatly from the study's insightful analysis of the social aspects of the bioeconomy.

6.1 Implications / Management Recommendations

The study's conclusions have several significant ramifications for managers, decision-makers, and bioeconomy stakeholders. These suggestions seek to address the issues raised and take advantage of the chances to increase young people's involvement in the bioeconomy.

1. Enhance Educational Programs: Enhancing the integration of bioeconomy issues in secondary and higher education curricula is obviously necessary. Academic institutions ought

to work in conjunction with industry players to create all-encompassing curricula that address crucial facets of the bioeconomy. Increased access to practical skills-focused vocational training programs in bioeconomy sectors is necessary to close the skills gap for individuals with lower educational attainment. This will increase the number of young people who can access job prospects. Enhancing knowledge and interest in bioeconomy issues can be achieved through integrating interactive and hands-on learning activities. Field trips, workshops, and internships are examples of initiatives that ought to be supported.

2. Increase Awareness Campaigns: Public education and government agencies should start awareness initiatives to increase people's understanding of the bioeconomy. These advertisements must primarily target youth and emphasize the advantages and career prospects in this field. Leveraging social media and other digital platforms can effectively reach a wider audience and engage young people in conversations about the bioeconomy.

3. Strengthen Government Policies and Initiatives: Legislators must create and execute programs that especially encourage young people to participate in the bioeconomy. This involves giving young business owners and startups in the bioeconomy sector grants, subsidies, and incentives. To make sure that current government initiatives are effectively serving the needs of youth, they must be evaluated and improved. This may entail forming youth advisory panels to direct the creation of policies. Fostering partnerships among governmental bodies, private sector enterprises, and academic establishments can establish a more conducive environment for youth in the bioeconomy.

4. Foster Industry Partnerships: Businesses in the bioeconomy space ought to get involved with academic institutions to give students access to opportunities and real-world knowledge. This could involve industry placements, cooperative research initiatives, and mentoring

programs. It is important to create and disseminate clear career pathways to youth to assist them comprehend the possibilities for employment and professional advancement in the bioeconomy.

5. Targeted Outreach Programs: Outreach initiatives must to be designed with young people's differing degrees of awareness and comprehension in mind. Lower awareness levels should receive special attention, especially in areas and among certain populations. Getting involved with grassroots groups and local communities can aid in information dissemination and the development of a more diverse bioeconomy movement.

6.2 Limitations of the Study

Although this study offers insightful information about the obstacles and opportunities facing young people who want to participate in the bioeconomy, it should be noted that it has certain limitations. The study's sample size might not be big enough to extrapolate the results to a larger population, even though it is adequate for providing first insights. A bigger sample size would yield more reliable data and improve the validity of the conclusions made. Most of the replies to the survey were from European nations. As a result, the results might not be entirely indicative of young people worldwide or relevant to areas outside of Europe. Regional variations in education, economics, and culture may have an impact on the outcomes. The study only looked at people between the ages of 15 and 24. Although comprehending youth engagement requires an awareness of this age group, it ignores perspectives from younger adolescents and older young people who might also have important roles in the bioeconomy.

Survey participants' self-reported data is what the study uses. Social desirability bias, recall bias, and respondents' propensity to give what they believe to be the "right" responses rather than their actual thoughts or experiences are just a few examples of the biases that can affect self-reported data. The study may not go thoroughly into any one of the bioeconomy's niches

or subsectors, but it does cover many of its facets. More focused insights might come from a closer look at certain topics like biotechnology, sustainable agriculture, or renewable energy. Non-response bias is a concern, meaning that people who declined to answer the survey could have different opinions or be less involved in the bioeconomy than people who responded. The results' representativeness may be impacted by this bias.

6.3 Proposed Future Research

Proposed Future Research involves several key areas for improvement. In the future, studies should strive to greatly expand the sample size to improve the results' dependability and generalizability. A more robust data set, which enables more in-depth research and more assured conclusions, will be produced by a larger and more varied sample. Expanding the study's geographical focus to non-European nations will provide a more thorough grasp of young people's participation in the bioeconomy around the world. Studies that compare several locations can show how disparities in culture, economic status, and educational attainment affect youth involvement.

A more comprehensive understanding of young people's involvement in the bioeconomy will result from considering a larger age range, including younger adolescents and older young adults. This can assist in identifying requirements and opportunities for certain youth category age groups. The data will be enhanced by the addition of qualitative research techniques including focus groups, interviews, and case studies, which offer a deeper understanding of the goals, difficulties, and unique experiences of young people. Comprehending the dynamic character of young engagement in the bioeconomy will be made easier with the use of longitudinal studies that monitor changes in awareness, opportunities, and obstacles over time. This method can capture how changing market conditions, educational programs, and policy

changes affect young people's involvement. Targeted insights can be obtained by concentrating on sub-sectors of the bioeconomy, such as biotechnology, sustainable agriculture, renewable energy, and bio-based enterprises.

This can direct more focused educational and policy actions and aid in recognizing the special opportunities and difficulties within each subsector. Future research should include techniques like follow-up surveys and participation incentives to reduce non-response bias. The findings will be more credible if the sample is typical of the larger population. Future studies ought to try to include respondents with a wide variety of socioeconomic backgrounds and educational backgrounds. This will make it easier to comprehend how these variables affect knowledge about, access to, and difficulties with the bioeconomy. A more thorough analysis of regionally-specific government policies and programs will provide light on the ways in which different initiatives help or impede youth involvement. Comparative analyses can pinpoint areas that require improvement as well as excellent practices. Examining the long-term professional results of youth involved in the bioeconomy can yield important information about how well educational initiatives and employment prospects work. This can assist in creating interventions that promote long-term professional development in the bioeconomy.

6.4 Global Aspect of this Study

There are significant international implications to the studies on youth participation in the bioeconomy, especially when considering global trade and economics. The bioeconomy concept is transnational in scope, impacting international markets, trade, and economic policies as it evolves and is applied across national borders. The following highlights this study's significance for the global dimension:

1. Integration of Global Markets: The bioeconomy includes industries that are essential to international trade and market integration, including biotechnology, sustainable agriculture, renewable energy, and bio-based products. This study emphasizes the different ways that youth can impact the dynamics of international business and contribute to different disciplines. International businesses are better able to customize their strategies for talent acquisition and market expansion when they have a thorough understanding of the opportunities and constraints that young people encounter worldwide.

2. Cross-National Cooperation: International cooperation in R&D and innovation is essential to the bioeconomy's success. Through an analysis of youth participation in the bioeconomy across multiple nations, this study emphasizes the significance of cross-border collaborations. International cooperation can hasten the development of sustainable practices and technology by utilizing a variety of knowledge bases and points of view.

3. Harmonization of Policies: Government initiatives and policies have a major role in promoting youth participation in the bioeconomy. This study provides a basis for policy harmonization by illuminating the ways in which different countries permit or discourage adolescent participation. Politicians could use ideas from other countries' successful bioeconomy development initiatives and adapt them to suit their own local context to support a more coordinated worldwide approach to the bioeconomy's development.

4. Taking Up Global Issues: Addressing global issues including resource depletion, climate change, and environmental sustainability will need a shift to a bioeconomy. Engaging youth is essential to generating the creative answers required to resolve these problems. This study

highlights the importance of youth participation in the bioeconomy and the necessity for global initiatives that maximize young people's potential to build sustainable futures.

5. Educational Exchange and Mobility: The findings of the research might influence international bioeconomy-focused educational programs and exchanges. When educational institutions evaluate the needs and opportunities for youth participation, they can design curricula and exchange programs that support the transfer of knowledge and skills across borders. This improves student and professional mobility and fortifies the ties that connect the workforce of the world together.

6. Economic Impact: The bioeconomy may bring about significant economic benefits like job creation, economic diversification, and sustainable growth. This study highlights the financial ramifications on a national and international level by examining the opportunities and challenges that young people in the bioeconomy face. Investing in youth engagement in the bioeconomy can provide a country a competitive advantage in the global market by luring investment and fostering economic resilience.

7. Cultural Exchange and Innovation: Young people's involvement in the bioeconomy can foster innovation and cross-cultural exchange since they bring fresh viewpoints and original ideas to address global issues. This study emphasizes how critical it is to develop a worldwide network of emerging leaders in the bioeconomy who can cooperate and create across national and cultural divides.

Summary:

The implications of this research for global market integration, cross-border cooperation, harmonizing policies, and tackling global difficulties clearly demonstrate its international scope. This research aids in the creation of a sustainable and inclusive global bioeconomy by illuminating the role of youth in the bioeconomy and promoting international cooperation. These insights can be used by companies, educators, and policymakers to foster young participation and foster innovation that will promote global sustainable economic growth.

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8. Appendix

8.1 Survey on Youth Engagement in the Bioeconomy: Opportunities, Challenges, and Perspectives - Survey Questions

1. What is your age?

Options: 15-24

2. What is your gender?

Options: Female, Male, Diverse, Prefer not to say

3. In which European country do you currently reside?

Options: Country Name

4. What is your current employment status?

Options: Student, Self Employed, Employed, Prefer not to say, other

5. What is your highest level of education completed?

Options: High school, Bachelor's degree, Master's degree, Doctorate, Prefer not to say

6. What are you currently pursuing?

Options: High school, Bachelor's degree, Master's degree, Doctorate, Working professional, Prefer not to say

7. Before completing this survey, were you familiar with the phrase "Bioeconomy"?

Options: Yes, No, Somewhat

8. How would you rate your understanding of the concept of Bioeconomy on a scale of 1 to 5?

Options: 1-5

9. What sources do you primarily rely on for information about the Bioeconomy?

Options: Academic Journals, News articles, Government publications, Online forums & communities, Social Media, Educational Institutions, Workplaces, Not relevant, others

10. According to you what are the best ways to acquire knowledge about Bioeconomy?
(optional)

11. How important do you think the Bioeconomy is for addressing global environmental challenges?

Options: Very important, Important, Somewhat important, Not very important, Not important at all

12. To what extent do you believe the Bioeconomy can contribute to sustainable development?

Options: To a great extent, To a moderate extent, To a small extent, Not at all

13. How optimistic are you about the potential of the Bioeconomy to create economic opportunities for young people?

Options: Very optimistic, Optimistic, Neutral, Pessimistic, Very pessimistic

14. What specific economic opportunities or benefits do you envision the Bioeconomy providing for young people in the future? (optional)

15. Have you encountered any courses or educational materials related to the Bioeconomy outside of formal schooling (e.g., workshops, online courses)?

Options: Yes, I have participated in workshops or online courses, Yes, I have come across educational materials online, No, I have not encountered any outside of formal schooling, Not applicable/I prefer not to answer.

16. Do you think educational institutions adequately prepare young people for careers in the Bioeconomy?

Options: Yes, they provide sufficient preparation, Somewhat, but there could be improvements, No, there is room for significant improvement, Not sure/I prefer not to answer.

17. Would you be interested in participating in Bioeconomy-related educational programs or workshops?

Options: Yes, I would be very interested, Yes, I would be somewhat interested, No, I am not interested, Not sure/I prefer not to answer

18. Have you actively searched for employment opportunities in the Bioeconomy sector?

Options: Yes, I actively search for bioeconomy-related jobs, Yes, but I have not found suitable opportunities, No, I have not actively searched, Not applicable/I prefer not to answer.

19. What factors do you consider when evaluating job prospects in the Bioeconomy?

Options: Salary and benefits, Career growth opportunities, Alignment with personal values and interests, Work-life balance, Sustainability, Location, Company reputation, Opportunities for innovation, Not applicable/I prefer not to answer, Other

20. What skills or knowledge areas do you think are most important for succeeding in a Bioeconomy-related career?

Options: Scientific knowledge (e.g., biology, chemistry), Sustainability principles and practices, Research and analytical skills, Entrepreneurial mindset, Communication and teamwork, Adaptability and creativity, Technical skills (e.g., biotechnology, renewable energy), Not sure/I prefer not to answer.

21. In your opinion, what are some of the key challenges young people might face when pursuing careers in the Bioeconomy, and how do you think these challenges can be addressed? (optional)

22. Are you aware of any government initiatives or programs aimed at supporting young people's involvement in the Bioeconomy?

Options: Yes, I am aware of specific initiatives or programs, No, I am not aware of any initiatives or programs, I am not sure/I prefer not to answer.

23. If you answered yes to the above question please list them below. (optional)
24. How effective do you think government policies are in promoting youth participation in the Bioeconomy?
- Options: Very effective, Somewhat effective, Not very effective, Not effective at all, Not sure/I prefer not to answer.
25. What specific types of support or resources do you believe would encourage more young people to engage in Bioeconomy-related activities?
- Options: Funding for education and training programs, Mentorship and networking opportunities, Access to research and internship opportunities, Policy incentives for bioeconomy innovation, Support for startups and small businesses, Public awareness campaigns, Not sure/I prefer not to answer.
26. What motivates you to learn more about the Bioeconomy and potentially pursue a career in this field?
- Options: Concern for environmental sustainability, Interest in innovative technologies and practices, Desire to contribute to global challenges, Personal values aligned with sustainability, Potential for career growth and opportunities, Influence of family or peers, Not sure/I prefer not to answer.
27. Have you ever participated in any projects or initiatives related to sustainability or environmental conservation?
- Options: Yes, I have actively participated, Yes, but my participation was minimal, No, I have not participated, Not sure/I prefer not to answer.

28. How likely are you to actively engage in activities or projects related to the Bioeconomy in the future?

Options: 1-5

29. Do you have any feedback for this survey? (optional)

8.2 Figures & Tables

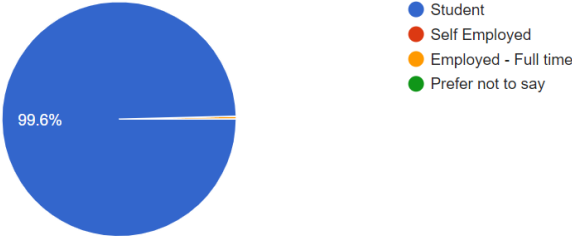


Figure 4: Current Employment Status of Survey Respondents

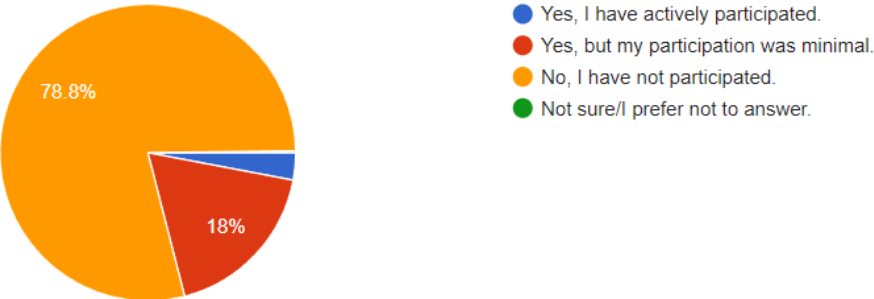


Figure 23: Participation in Sustainability or Environmental Conservation Projects