



Green growth, a-growth or degrowth? Investigating the attitudes of environmental protection specialists at the German Environment Agency

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ABSTRACT

Green growth, a-growth, post-growth and degrowth are prominent concepts on the role of economic growth for achieving environmental sustainability. In this article, we investigate the attitudes of environmental protection specialists towards these concepts by conducting a survey with employees of the German Environment Agency (UBA). We develop three measures of attitudes towards the concepts: An *implicit position* based on responses to statements related to the debate on economic growth and the environment, a *position choice* based on choosing one concept without referring to its name and an *explicit position* based on choosing a concept with reference to its name. The analysis leads to four major results. (1) Environmental protection specialists predominantly express a preference for growth-critical concepts (a-growth/post-growth and degrowth) as compared to green growth. (2) A-growth/post-growth is the most favoured concept. (3) The results are stable for all three attitude-measures. (4) Specialists with more knowledge on the concepts are even more likely to prefer growth-critical concepts. Our results further support previous empirical findings that a large share of people and, in particular, specialists are in favour of growth-critical concepts, making policy-options towards such concepts more feasible.

1. Introduction

There is disagreement on how comprehensive and radical the economic transformation to achieve environmental sustainability ought to be (Drews and Reese, 2018). In this article, we present and discuss the results of a survey with German environmental protection specialists, i. e. employees of the *German Environment Agency (UBA)*,¹ on their knowledge of and attitudes towards four different concepts related to this transformation.

Green growth deems economic growth and sustainability to be compatible. Degrowth is building on long-standing growth critique according to which growth is intrinsically not sustainable (Schneider et al., 2010). A-growth is included as a third midway position (van den Bergh and Kallis, 2012) between green growth and degrowth (e.g. Grunwald, 2018; Petschow et al., 2020; Sandberg et al., 2019; van den Bergh, 2017). A-growth's main characteristic is its indifference towards economic growth and the Gross Domestic Product (GDP) (van den Bergh, 2011). In addition to these prominent concepts, the specialists' opinions on the "precautionary post-growth approach" (Petschow et al., 2020)

are examined. The precautionary post-growth approach follows a similar reasoning as the a-growth approach but additionally highlights the importance to deal with societal growth dependencies to protect the environment (Petschow et al., 2020).

This article makes two novel contributions to the existing literature. While a growing body of research describes how green growth, degrowth and a-growth are perceived by the public and scientists, our study focuses exclusively on environmental protection specialists. Examining the opinions of environmental specialists is particularly insightful. They dispose of high knowledge on the subject matter and hence their opinion is a valuable contribution to the question, which concept should be pursued. In addition, their opinions influence policy-making (Javeline et al., 2013), as they inform the work of governmental environmental institutions, which in turn influence policy-makers, and also implement environmental legislation themselves (Umweltbundesamt, 2020). Javeline and colleagues found that "the most knowledgeable experts may be the most useful in informing policymakers across all branches of government and levels of decisionmaking" (2013, p. 667).

The second novel contribution is to investigate opinions in Germany.

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¹ The abbreviation UBA is used in the following for German Environment Agency (German: Umweltbundesamt).

Germany is a particularly interesting case, as it is a major international political and economic actor and the world's fourth largest economy (Bajpai, 2020; Dustmann et al., 2014). The country also plays a central political role within Europe (Bruno and Finzi, 2018) and is an important actor for international environmental issues, especially on climate change (Wurzel et al., 2019).

The UBA is the main environmental protection agency in Germany (Umweltbundesamt, 2018a) and is considered to be the largest and most powerful environmental agency in Europe (Balser and Ott, 2016). It will play a crucial role regarding the country's future stance on how to deal with the economic transformation needed to achieve environmental protection. The agency fosters a cooperative style of work, and the expertise of the employees is included in the decision-making processes of the agency (Umweltbundesamt, 2018a, 2018b, 2020).

In section 2, we provide a literature review on the above-mentioned concepts, as well as on prior surveys assessing how these concepts are perceived. Section 3 outlines our survey methodology and section 4 presents our results. In section 5, we discuss the results as well as limitations of the research. Section 6 offers conclusions and points out avenues for further research.

2. Literature review

In the following, we review the main aspects of prominent concepts on the relationship between economic growth and the environment, namely green growth, degrowth and a-growth. Additionally, we discuss the term post-growth and introduce the recently developed precautionary post-growth approach (2.1). In the second part, we review existing surveys on attitudes towards these concepts (2.2).

2.1. Prevailing concepts on economic growth and the environment

In our study, we focus on prominently discussed concepts of economic growth and environmental sustainability – green growth, degrowth and a-growth – which are central to the academic debate regarding high-income countries, particularly in Europe. We introduce each of these concepts and add post-growth as well as the precautionary post-growth approach which are relevant to the German discussion. The concept of the steady-state economy (SSE) – as proposed by Daly (1973) – was excluded as our study focuses on concepts prominent in European discussions, while SSE is mostly discussed in North America (Martínez-Alier et al., 2010).²

According to proponents of green growth, it is possible to decouple economic growth and environmental throughput (e.g. Hepburn and Bowen, 2013; Jacobs, 2012). While absolute decoupling is often defined as an absolute reduction in resource use or emissions while GDP grows (Fedrigo-Fazio et al., 2016; Hickel and Kallis, 2019), sufficient absolute decoupling describes the speed of reduction needed to achieve certain environmental goals (Antal and van den Bergh, 2016; Lange et al., 2020). According to green growth proponents, it is possible to reconcile economic growth with such absolute decoupling; they claim that economic growth is necessary to achieve it – primarily because economic growth generates more efficient technologies (Ekins, 2002).

In sharp contrast to green growth advocates, degrowth proponents are convinced that the economic and societal changes necessary to achieve a sufficient reduction in environmental throughput cannot be accompanied by continuing economic growth (e.g. Jackson, 2016; Kallis et al., 2018). While degrowth proposals are very heterogeneous, the

following definition is often used³: “an equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions at the local and global level, in the short and long term” (Schneider et al., 2010). Degrowth explicitly relates to the early industrialised nations of the Global North as they are and have been historically causing the biggest environmental damage and profited most from economic growth (Schmelzer and Vetter, 2019). The concept originated in the Global North and is developed for this context, although questioning economic growth and Western-style development is influenced by and relevant to the Global South as well (Demaria et al., 2013; Kothari et al., 2014). While the degrowth movement is currently stronger in Europe, it is also present in other parts of the world (Kothari et al., 2019). Discussions on degrowth are and ought to be combined with post-development approaches as they share “a vision of alternative worlds based on ecological integrity and social justice” (Escobar, 2015, p. 451). This, however, goes beyond the scope of our research.

A-growth is a third midway-concept. It was largely conceptualised and brought into discussion by Jeroen van den Bergh.⁴ According to him, everyone should be agnostic and neutral about economic growth (van den Bergh, 2011). He posits that being indifferent about economic growth regarding the rise or fall of GDP is the most effective approach for sustainability because it is more likely to be socially and politically accepted than a degrowth strategy (van den Bergh, 2011). This would open a broader spectrum of employable policy measures, in comparison to focusing on either growth or degrowth strategies (van den Bergh, 2017). As a result, van den Bergh proposes to “worry and think about effective environmental and complementary policies, in terms of both their design and social-political feasibility” (2011, p. 888) aiming neither at green growth nor degrowth.⁵

Comparing Victor's (2008), Latouche's (2009) and Jackson's (2009) books, as major pieces in the degrowth literature, Haapanen and Tapio (2016) find that all three authors show an a-growth attitude if social and environmental goals are achieved, blurring the line between degrowth and a-growth. Haapanen and Tapio suggest that a-growth and degrowth are compatible and successive concepts in the form that “deliberate degrowth thinking might be needed at first in order to reach – as a society – the a-growth attitude” (p. 3501).

In German-speaking countries, the term post-growth (“Postwachstum”) is widely used (e.g. Schmelzer and Passadakis, 2011; Seidl and Zahrnt, 2010). *Postwachstum* can entail both a-growth and degrowth positions.⁶ For being specific, the English term degrowth is sometimes used in German publications instead of *Postwachstum* (Burkhart et al., 2017, 2020).

A specific variant of post-growth is the precautionary post-growth approach. Originating from ideas by Seidl and Zahrnt (2010), it was further developed by Petschow et al. (2020). The precautionary post-growth approach starts from the a-growth position that it can neither be proven that sufficient decoupling is possible, nor that it is not

² Additionally, the SSE was considered to be related to degrowth as described by Kerschner (2010, p. 549) who finds that “economic de-growth in the North provides a path for approximating the goal of a globally equitable SSE, by allowing some more economic growth in the South”.

³ This definition is controversially debated, but it is commonly referred to in the degrowth literature (Johnsen et al., 2017, see discussion on p. 194ff).

⁴ Serge Latouche, one of the leading degrowth and post-development thinkers, posited in 2007 that theoretically one should talk about a-growth instead of degrowth. A-growth here relates to a-theism, as it is about giving up the belief in progress, development and growth for growth's sake (Latouche, 2015).

⁵ Jakob and Edenhofer (2014) develop a similar position. They state that the debate on economic growth and the environment should focus on social welfare instead of economic growth. They propose to use ‘welfare diagnostics’ to measure this welfare and to base policies on this foundation.

⁶ For example, Schmelzer and Vetter (2019) use the terms degrowth and *Postwachstum* explicitly as synonyms, while arguing along the lines of degrowth. Paech (2012a, 2012b) also uses the term *Postwachstum* and states that economic growth and environmental sustainability are irreconcilable. Other authors use the term *Postwachstum* while following the logic of a-growth (Adler et al., 2017; Reichel, 2017).

possible. Hence, the approach does not support the main premises of either degrowth or green growth. Petschow et al. (2018a, p. 20)⁷ derive three key requirements from their analysis: an “effective design of economic framework conditions” to internalize environmental externalities, an “exploration and development of new paths of societal development” to develop new forms of economic and day-to-day practices, and the “identification and realization of potentials for a more growth-independent design of societal institutions.” The precautionary post-growth approach is different from a-growth in that it does not posit that indifference to economic growth is the best way, as society is growth-dependent in its current set-up. This dependency needs to be eliminated to make room for stringent environmental policy measures.

The five terms covered here – green growth, degrowth, a-growth, post-growth, and the precautionary post-growth approach – illustrate a variety of concepts regarding the question of how to achieve environmental sustainability. We sometimes define the latter four concepts as growth-critical concepts throughout this article, in contrast to green growth as a growth-oriented concept. Green growth and degrowth represent the extremes of this spectrum with articulated stances on economic growth and sustainability. A-growth and the precautionary post-growth approach are midway positions. Post-growth can either refer to such a midway position or to degrowth in the German context. In the next section, we look at how these concepts are perceived by scientists and the public.

2.2. Existing surveys

Surveys are used to investigate attitudes regarding the relationship between economic growth and the environment in general and towards the concepts of green growth, degrowth and a-growth. The following section reviews such surveys on the attitudes of the public and of scientists, mainly economists.

Spanish public and international scientists on green growth, a-growth and degrowth: According to Drews and van den Bergh (2016), the majority of the Spanish public implicitly supports green growth compared to growth-at-all-costs, a-growth and degrowth, based on a representative sample of 1008 Spanish citizens. In a subsequent study with 814 respondents, the same authors found that international scientists⁸ were more growth critical (Drews and van den Bergh, 2017).⁹ Drews et al. (2019) divided both the samples composed of citizens and scientists of the prior studies in three clusters, namely green growth, a-growth and degrowth. Following this analysis, a-growth was the favoured approach by both samples instead of green growth.

Canadian public clustered in groups similar to green growth, a-growth and degrowth: Tomaselli et al. (2019) conducted a survey with 1001 respondents on Canadians' opinions on the relationship between economic growth, prosperity and the environment. In this survey, few people strongly agreed with growth at all costs. They distinguished three clusters similar to the ones used in Drews et al. (2019) (see Tomaselli et al., 2019, pp. 47–48). Most respondents in their sample were “Assured” which is close to green growth. The cluster of the “Ambivalent” corresponding to a-growth was smaller, followed by the smallest group, the “Concerned” corresponding to degrowth (Tomaselli et al., 2019, p. 41).

⁷ Our research and questionnaire are based on the German original version of the report (Petschow et al., 2018b) and on the English summary (Petschow et al., 2018a). Since conducting our research, a full English translation (Petschow et al., 2020) has been published with slightly different wording than in the English summary.

⁸ The scientists came from diverse backgrounds, “including growth theory, general economics, environmental economics, ecological economics, environmental social sciences, and natural sciences” (Drews and van den Bergh, 2017, p. 88).

⁹ The exact figures for both studies are provided in Table 6 in section 5.2.

We display the results from Drews et al. (2019) and Tomaselli et al. (2019) in Fig. 1. Overall, the international scientists were most growth critical among the three groups, i.e. they had the highest percentage favouring degrowth and a-growth. While a-growth is the single most prominent position in two groups, green growth is the most prominent in one group.

Economists' opinions on the growth vs. environment debate, green growth and degrowth: Four surveys investigated economists' opinions on economic growth and the environment. Spash and Ryan (2012) compared ecological, heterodox and neoclassical environmental/resource economists thanks to a survey including 184 respondents. Ecological economists aimed at adhering to biophysical limits and recognised “limits to material consumption as a means for increasing well-being” (Spash and Ryan, 2012, p. 1116), in sharp contrast with the pro-growth attitude and technological optimism of mainstream economic positions.

Howard and Sylvan (2015) contrasted the views of 365 economists with the general public on climate change, finding that economists call for more active responses to climate change and are more concerned about the issue than the public. 80% of the economists stated that climate change would be likely or very likely to negatively affect growth rates (Howard and Sylvan, 2015).

In Carattini and Tavoni's (2016) survey with 242 respondents, 75% of environmental and resource economists favoured green growth, while only 11% of them supported degrowth. On the contrary, among ecological economists only 20% argued for green growth whereas 68% supported degrowth.

Haab and Whitehead (2017) investigated the opinions of 352 environmental and resource economists: 46% agreed to the claim that “[e]conomic growth is needed in order to protect the environment” (p. 50), displaying a green growth position. However, this means that 54% did not advocate a clear green growth position. They find that many of them lean towards a-growth (rather than degrowth), as 78% disagreed that “[e]conomic growth always harms the environment”, while 74% agreed that “[s]ome pollution is inevitable if we are going to continue to make improvements in our standard of living” (p. 49).

Conclusions from existing surveys: This review of existing surveys leads to three main conclusions. First, the small number of surveys suggests a substantial research gap. Population wide surveys only exist for Spain and Canada, showing a surprisingly high support for growth critical measures. The review of surveys with economists reveals that there are different groups within this discipline – with environmental/neoclassical economists more supportive of green growth and ecological economists more supportive of degrowth. This is not surprising as these groups have been important in developing these concepts in the first place. More surprising is that many environmental economists, who are mostly supporters of green growth (Carattini and Tavoni, 2016), see a problem in economic growth – as climate change may negatively affect growth rates (Howard and Sylvan, 2015). Interestingly, many environmental economists indicate a tendency towards a-growth as they do not support that economic growth is needed to achieve environmental sustainability (Haab and Whitehead, 2017).

Beyond economists, another interesting group to investigate are environmental protection specialists, as they have experience on these issues and help shaping environmental policies. To our knowledge, there have not yet been any surveys targeting them specifically¹⁰ and scrutinizing their stance on the growth vs. environment debate. Our survey, discussed below, aims to help fill this research gap.

3. Methodology

We conducted an online survey which was administered to all 1593 UBA employees via SoSci Survey (Leiner, 2019). It was refined

¹⁰ Some environmental experts were included in the survey by Drews and van den Bergh (2017).

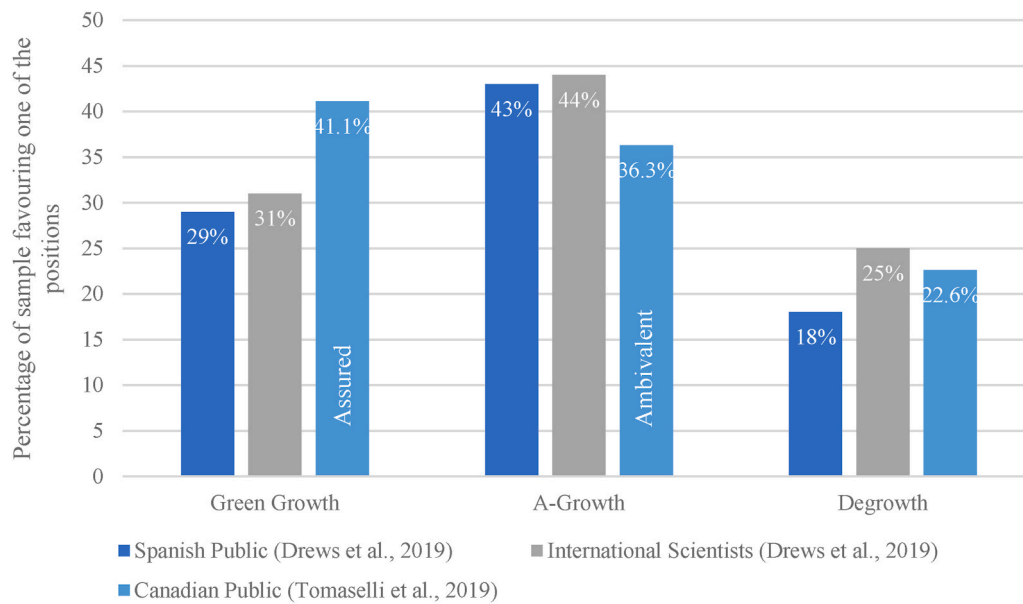


Fig. 1. Results of surveys clustering respondents into three growth concept categories.

Source: Own depiction based on results described in [Drews et al. \(2019\)](#), and [Tomaselli et al. \(2019\)](#).

Note: There were also 10% of “indifferent” people in the Spanish Public sample, which are not depicted in this graph.

beforehand using a pre-test with external experts as well as UBA employees with varying backgrounds to control the understanding of the questions and adjust the language where necessary. In the following we summarize major descriptive statistics of the sample (3.1) and describe the survey design as well as data analysis (3.2).

3.1. Descriptive statistics of the sample

The average completion time of the 259 respondents who completed the survey (response quote of 16.26%) was 22.3 min.¹¹ Compared to all 1593 employees, the final sample is a good representation of the UBA in terms of gender distribution, age, and length of service. The participants had a very high level of formal education, with many having a background in environmental science or environmental technology ($n = 98$), followed by biology ($n = 49$) and chemistry ($n = 48$). Overall, 38 different fields of study were indicated – selection of multiple fields was possible. The descriptive statistics for the socio-demographic data are provided in [Table 1](#).

3.2. Survey design and data analysis

The questions in the survey were adapted and translated from other questionnaires, or self-developed based on the literature review. We measured the UBA employees’ attitudes on concepts regarding economic growth and the environment, including their interest in the topic, as well as their knowledge of the topic. All questions, except demographics, can be found in the appendix in the order in which they were asked.

We used three different types of questions for measuring the employees’ attitudes on green growth, degrowth and a-growth. Two of these approaches asked for the attitudes implicitly while the third one was explicit.

Position Statements and Implicit Position (appendix A/Table 2): Following the surveys conducted by [Drews and van den Bergh \(2017\)](#),

Table 1
Socio-demographic data of the survey participants ($N = 259$).

Variable	N (number)/ Range	Percentage/Mean in years (SD – standard deviation)
Gender		
Female	139	53.7%
Male	111	42.9%
Inter/Trans/Diverse	0	0%
Not Indicated	9	3.5%
Age		
	250/22–65 years	$M = 41.71$ (10.71)
Not Indicated	9	3.5%
Highest Academic Qualification		
Secondary School Degree	5	1.9%
High School Degree	21	8.1%
University Degree	161	62.2%
Doctorate Degree	64	24.7%
Not Indicated	8	3.1%
Length of Service		
	259/0–37 years	$M = 10.07$ (8.66)
Career Track		
Simple Service	1	0.4%
Intermediate Service	25	9.7%
Higher Intermediate Service	55	21.2%
Higher Service	166	64.1%
Other	12	4.6%

and specifically as described in [Drews et al. \(2019\)](#), we asked the respondents indirectly via several statements on 7-point Likert scales what they thought about the growth vs. environment topic. The answers on these *position statements* can be related to their position regarding green growth, a-growth and degrowth. The highest or lowest values either fit to a degrowth or green growth position and the middle values are deemed to represent an a-growth approach. We show the results on these position statements in [Table 2](#). Reliability analysis (measured by Cronbach alpha’s coefficient which has a value of 0.859 for our survey) on these statements indicates a good internal consistency to measure the position of people regarding green growth, a-growth, degrowth.

From the position statements we calculated the *implicit position* of the

¹¹ For this paper, only parts of the original survey were included so that the completion time for our final survey would be significantly shorter.

respondents: To merge all items of the scale, i.e. all position statements, into one figure per respondent reflecting their position, we inverted the items in italics in Table 2 and calculated the mean on all statements. Strong agreement ($M > 5$) on an item represents a degrowth position and low agreement ($M < 3$) a green growth position. Medium values ($3 \leq M \leq 5$) indicate an a-growth orientation of the respondent. Implicit position hence describes how one person answered in mean on all the statements. Through merging the results of all items into one mean value per person, we can compare the implicit positions of the respondents.

In the survey, we extended the 16 statements used by Drews et al. (2019) which either belong to green growth or degrowth by three further statements related to ideas of the precautionary post-growth approach to indirectly measure approval of this specific concept. The statements marked with * in the table were taken from the report presenting the approach (Petschow et al., 2018b). They are not necessarily unique to this approach, but they served to measure accordance with the precautionary post-growth approach. However, we did not include these three additional statements in the development of the implicit position because they do not describe either a clear green growth or degrowth position and thus cannot be directly merged with the items developed by Drews and colleagues.

Position Choice (appendix B): Building again on Drews et al. (2019), we asked about people's favoured strategy regarding economic growth and the environment, which we call position choice hereafter. People could choose between four positions, which did not directly mention the terms green growth, degrowth, etc. Position 1 supports growth no matter what implications it has. Position 2 describes green growth, position 3 a-growth and position 4 degrowth. We did not add post-growth to be able to directly compare the results with Drews et al. (2019).

Explicit Approval (appendix D): To test the participants' approval explicitly, we asked all participants to rate their agreement with green growth, degrowth, a-growth and post-growth (*Postwachstum*) (on a 7-point Likert scale, plus option 'I cannot assess this'). Growth-at-all-costs was considered unappealing for environmental specialists, so that it was omitted. As *Postwachstum* is a German term often but not always used like degrowth (see section 2.1), we added it to the question.

Precautionary Post-Growth Approach (appendices E and F): Further, we wanted to see how the UBA employees related to a position recently developed in a report commissioned by the UBA itself – the precautionary post-growth approach. The participants were asked to indicate their level of knowledge about or involvement with the report which presented the precautionary post-growth approach. Then they were shown a summarised explanation of the approach. Otherwise, most participants would have been unlikely to be able to answer the subsequent questions as the knowledge of the report was anticipated to be low. They were then asked about their agreement with and interest in this position (7-point Likert scale, plus option 'I don't know'). Additionally, we tested their agreement (same scale) regarding the three key requirements resulting from the precautionary post-growth approach as described in section 2.1.¹²

Interest in the Topic (appendix G/Table 4): We used the same scale to check the UBA employees' interest in the topics which were touched upon in the survey and how they assessed its relevance. They were also asked whether they wished for a positioning of the UBA on the growth versus environment question and whether they thought that a post-growth position was realistic for the institution.

Knowledge (appendix C): Prior studies detected that opinions on the nexus of economic growth and environmental protection are related to environmental/ecological attitudes (Tomaselli et al., 2019). Researchers have found "that increasing an individual's knowledge results in more positive attitudes toward the environment" (Kukkonen et al.,

2018, p. 3). However, the relationship between environmental knowledge and attitudes is still "nebulous" (Vlaardingerbroek and Taylor, 2007, p. 120). To test the participants' knowledge on the concepts, we asked them explicitly if they had heard about green growth, degrowth, a-growth and post-growth. In the case they had heard about a concept, they were asked to describe it shortly and to rate how well they knew the term (6-point scale from 1 (low) to 6 (very good knowledge)). If not, there was a logical jump to the next concept. The text fields for describing the four concepts were scanned for common topics to understand relevant tendencies. Furthermore, we used the free text analysis provided by *SoSci Survey* which summarises the terms most used by the respondents.

Data Analysis: We evaluated the survey data quantitatively with descriptive statistics to measure the attitudes of the UBA employees as well as their knowledge on the topic. Additionally, we calculated correlations between the three measures describing attitudes on the concepts. Likert scales and frequency scales are regarded as continuous, so that we applied OLS regression. We did this to assess relationships between the measures. A one-way ANOVA was used to confirm the statistical difference between the green growth, a-growth and degrowth groups regarding their approval of the precautionary post-growth approach. We conducted further correlations and regression analyses on the relationship between attitude and knowledge variables and constructs. The level of statistical significance is set at $p < .05$.

4. Results

In the following, we first present our results on the different measures of attitudes on the concepts regarding growth and the environment (4.1). We then evaluate the participants' knowledge and look at its relation to those attitudes (4.2).

4.1. Attitudes towards the concepts and general interest

This section starts with the results regarding the three measures of attitudes – implicit position, position choice and explicit approval. This is followed by the relationships between these three measures. The section ends with the results regarding the fourth position – unique to the German debate – on precautionary post-growth.

Implicit Position: The position statements show the respondents' attitudes on the concepts of green growth, degrowth and a-growth implicitly – leading to the implicit position. The statistical results are shown in Table 2. Most often, the mean value of the answers by the whole sample on one statement indicates an a-growth position of the respondents (for nine items), while in the other statements the mean suggests a degrowth position (for seven items). The mean never resembled a green growth position. The statements based on the precautionary post-growth approach are indicated with an asterisk (*). Here, high agreement equals agreement to the approach, which was the case for two of the items. The mean value for all respondents collectively on the aggregated measure implicit position was $M = 4.91$ ($SD = 0.76$; $\min = 1.63$, $\max = 6.63$). This is close to a value of 5 on the Likert scale which means 'rather agree'. Therefore, the mean of the respondents resulted in a collective preference for the a-growth position, but with an inclination to degrowth rather than to green growth. There were only three respondents with a general green growth position ($M < 3$) according to implicit position. In contrast, 138 participants had an a-growth position ($3 \leq M \leq 5$) and 118 had a degrowth position ($M > 5$). The result is depicted in Fig. 2 (the left chart).

Position Choice: The measure position choice can serve as a tendency and comparison point to implicit position. The results for position choice are shown in Fig. 2 (the right chart) indicating that a-growth was implicitly favoured. Position 1, growth at all costs, was left out as it was not chosen by any participant.

These results fit with implicit position as in both a-growth was preferred implicitly over degrowth, with green growth landing in the

¹² Before this question and except for the explanation given here, we did not provide definitions of either of the concepts.

Table 2

Results for the position statements measuring implicit positions.

Label	Phrase	Mean (SD)	Mean Position
<i>Life Satisfaction</i>	Continued economic growth is essential for improving people's life satisfaction.	2.67 (1.35)	Degrowth
Linear Relationship*	There is no direct, linear relationship between GDP levels and social well-being.	4.37 (1.49)	PPGA
Re-define Well-being*	We need to (re-)define what well-being means for our society.	5.93 (1.07)	PPGA
<i>Public Services</i>	Economic growth is necessary to finance public health and pension systems.	3.80 (1.29)	A-Growth
<i>Stability</i>	Without economic growth the economy will become less stable.	3.63 (1.37)	A-Growth
<i>Environmental Protection</i>	Economic growth is necessary to finance environmental protection.	3.07 (1.33)	A-Growth
Full Employment	Full employment can be achieved without economic growth.	4.39 (1.50)	A-Growth
Good Life	A 'good life' without economic growth is possible.	5.59 (1.25)	Degrowth
Energy Rebound	Energy savings due to technological advances are partly undone by further economic growth.	5.44 (1.37)	Degrowth
Environmental Damage	Economic growth always harms the environment.	3.67 (1.47)	A-Growth
Development Space	In view of limited natural resources, rich countries may have to give up their economic growth to assure that all poor people in the world can reach a fair standard of living.	4.90 (1.41)	A-Growth
<i>Techno-fix</i>	Technology can solve all environmental problems associated with economic growth.	2.92 (1.49)	Degrowth
<i>Recovery</i>	Future economic growth will recover and again be as high as in the past.	3.32 (1.22)	A-Growth
<i>Post-materialism</i>	Economic growth raises incomes which in turn make people care more about the environment.	3.09 (1.43)	A-Growth
Excessive Political Attention	Politicians are too concerned about economic growth.	5.19 (1.30)	Degrowth
Income Inequality	Making the income distribution more equal should get a higher priority than economic growth.	5.48 (1.37)	Degrowth
Flawed Welfare Measure	The GDP is a flawed measure of social welfare.	5.59 (1.15)	Degrowth
Governmental Control	Economic growth can be controlled by the government.	4.75 (1.19)	A-Growth
Injustice*	The contribution of high-income countries to the global ecological problems, which cause the surpassing of planetary boundaries, is globally and inter-generationally unjust.	5.95 (1.19)	PPGA/all

Note: 16 statements are based on Drews et al., 2019, see their table 1; items in italics were later inverted for aggregate measure implicit position.

Statements with * are adapted from phrases by Petschow et al., 2018b and not included in Implicit Position. The mean refers to all respondents' agreement with the respective statement based on a 7-point Likert scale. PPGA is an abbreviation used for the precautionary post-growth approach in this table. SD is the abbreviation for standard deviation.

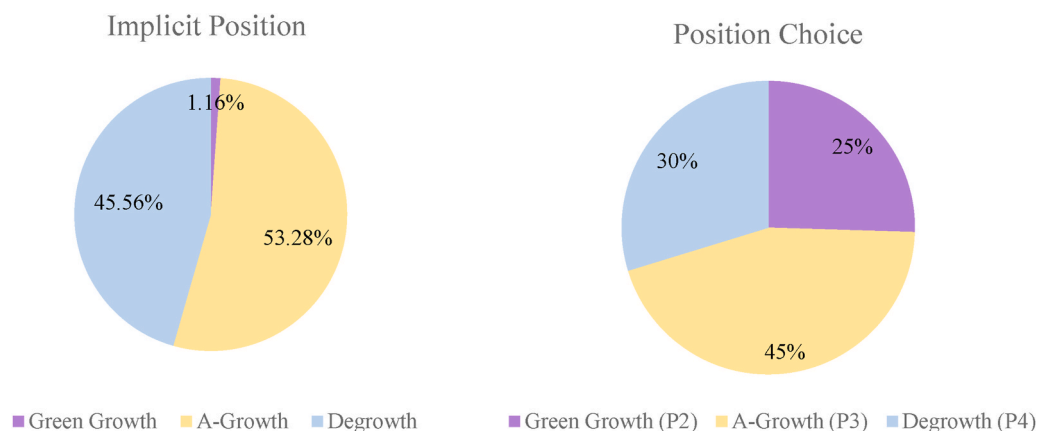


Fig. 2. Approval of green growth, a-growth and degrowth as of implicit position (left) in comparison to position choice (right) in percent.

Source: Own depiction based on survey results.

third place. However, the difference between green growth and degrowth was much smaller for position choice. For the relationship between both variables, an Eta coefficient $\eta = 0.60$ ($p < .001$) was found.

Explicit Approval: To test the explicit attitudes, the participants were asked to rate their agreement with the four concepts. We included post-growth here as this term is often used in German (see section 2.1). The results are shown in Table 3. Post-growth received the highest rating, followed by green growth and degrowth with the same mean. As only 40 respondents answered for a-growth, the judgment has lower explanatory value compared to the results for the other concepts.

To see whether people agreed with several of the four concepts, we conducted a bivariate correlation analysis amongst them. Agreement with post-growth was significantly positively correlated with agreement with degrowth ($r(114) = 0.43$, $p < .001$), as found in a bivariate

correlation analysis (Pearson coefficient¹³) with a two-tailed significance test. Post-growth was negatively correlated with green growth ($r(125) = -0.11$, $p = .231$) as well as with a-growth ($r(38) = -0.12$, $p = .475$), but neither of the correlations was significant. The result for degrowth was similar as it was also negatively correlated with green growth ($r(118) = -0.15$, $p = .093$) and a-growth ($r(37) = -0.05$, $p = .771$) but not significant. There was rarely any correlation between the agreement levels on green growth and a-growth and it was not

¹³ Likert and similar scales are considered as metric so that Pearson coefficient can be used (Hair, Jr. et al., 2016).

¹⁴ A presentation was given by the authors of the report at the UBA in autumn of 2019, which is likely responsible for the response of "Had heard about the report".

Table 3

Explicit approval of the four concepts post-growth, green growth, degrowth and a-growth.

Concept	N (number)	Mean (SD - standard deviation)
Post-Growth (<i>Postwachstum</i>)	133	5.22 (1.25)
Not Answered	126	
Green Growth	144	4.56 (1.50)
Not Answered	115	
Degrowth	123	4.56 (1.53)
Not Answered	136	
A-Growth	40	4.35 (1.37)
Not answered	219	

significant either ($r(38) = -0.01, p = .969$).

Relations of the Attitude Measures: Although most people favoured the a-growth position implicitly in position choice, they often could not name the concept. People with a higher score on implicit position (which resembles a degrowth position) were likely to explicitly agree with post-growth ($r(131) = 0.45, p < .001$) and especially degrowth ($r(121) = 0.57, p < .001$) while agreeing less with green growth ($r(142) = -0.29, p = .001$). The results for a-growth were not significant ($r(38) = 0.17, p = .282$).

Linear regression analyses showed that the implicit position was related to the extent to which the respondents explicitly approved of the concepts post-growth, green growth and degrowth. Indeed, the variance of the agreement on post-growth could be explained by 20.4% by implicit position and the result was significant ($\beta = 0.45, t(130) = 5.79, p < .001$). For green growth, the degree of explanation was lower with only 8.2% ($\beta = -0.29, t(141) = -3.55, p = .001$), but for degrowth it was 31.9% ($\beta = 0.57, t(120) = 7.62, p < .001$). This shows that the answers of the respondents on which concept they prefer is explicitly related to their thoughts about economic growth and the environment as tested implicitly on the 16 statements.

Our analysis shows that the relations between the different measures of positions are as expected. This – combined with the fact that the different measures indicate a similar overall view on the distribution among the concepts – suggests our measures to be robust.

Precautionary Post-Growth Approach: For the precautionary post-growth approach, we found high agreement not only on the items shown in Table 2 but also when asking about it explicitly (Table 4). Furthermore, the respondents strongly supported the three key requirements resulting from the precautionary post-growth approach as elaborated by Petschow et al. (2018a), particularly the first and the third ones.

Agreement with the precautionary post-growth approach was related with position choice ($\eta = 0.45$) and it was statistically significantly different between the three position groups in a one-way ANOVA ($F(2,198) = 25.61, p < .001$). The green growth group exhibited the lowest mean agreement (4.36 ± 1.31) which was different to both a-growth ($5.56 \pm 0.82, p < .001$) and degrowth ($5.49 \pm 0.087, p < .001$) proponents, following the Games-Howell post-hoc test. The degrowth and a-growth groups were not significantly different ($p = .867$). This shows that participants who chose degrowth and a-growth in position choice were significantly more likely to agree with the precautionary post-growth approach than those who chose green growth.

Interest in the Topic: Interest in the precautionary post-growth approach among the UBA employees was high as well as for the topic – the growth vs. environment debate – in general. The participants understood the importance of such a position and of the debate. They tended to think that the development and acceptance of a post-growth position at the UBA was realistic (Table 4).

Table 4

Results for questions on the precautionary post-growth approach and general interest in the topic.

Item	N (number)	Mean (SD)
After reading this summary of the precautionary post-growth approach, please evaluate all the following statements:		
I agree with this position based on my knowledge.	201	5.28 (1.07)
I would like to learn more about this position.	222	5.24 (1.22)
I think that such a basic economic position is relevant for the environmental topics I am working on.	208	4.68 (1.61)
The report [on the precautionary post-growth approach] contains three requirements. Please indicate your stance on them:		
A more effective design of economic framework conditions, in particular a resolute use of (market-based) instruments for the internalization of negative environmental externalities is necessary to comply with the planetary boundaries.	223	6.0 (1.02)
New paths of societal development should be explored and developed through participatory search processes, experimental spaces, and new approaches in innovation and re-search policy.	229	5.62 (1.13)
Potentials for a more growth-independent design of societal institutions should be identified and realized.	240	6.08 (.91)
This survey evolves around concepts/strands which are dealing with the connection between economic growth and environmental protection: Post-growth (specifically: precautionary post-growth approach) Green Growth, Degrowth and A-Growth. Representatives of the strands connect certain economic consequences with their research.		
Please indicate your stance towards the following statements.		
I deem the topic of this survey (connection between economic growth and environmental protection) to be relevant for my work.	244	4.44 (1.65)
I would like to learn more about this topic.	246	5.20 (1.22)
I would wish that the UBA further deals with this topic.	244	5.80 (1.03)
I would wish that the UBA develops an own principal position on this topic.	241	5.60 (1.17)
A position of the UBA regarding the growth question is necessary to make effective environmental protection possible.	245	5.36 (1.38)
I think that elaboration and acceptance of a post-growth position at the UBA is realistic.	214	4.85 (1.35)

Note: SD is the abbreviation for standard deviation.

We obtained two main results: 1) Overall, the growth-critical concepts are preferred to green growth by a clear majority of the UBA employees. 2) The UBA employees had implicitly favourable attitudes towards the a-growth position, although the large majority did not know the term or concept explicitly (see 4.2).

In the following section, we describe our results regarding the respondents' knowledge on the topic and its relationship to their attitudes on the concepts.

4.2. Knowledge and its relation to attitudes on the concepts

We have investigated four different aspects regarding knowledge: 1) how many people know the concepts of post-growth, green growth, degrowth and a-growth, 2) how well they know them, 3) how familiar they are with the precautionary post-growth approach, and 4) how their knowledge is related to their attitudes. We find that knowledge on all concepts is limited and that people knowing more about the concepts seem to prefer growth-critical concepts rather than green growth.

Amongst the 259 respondents, the term green growth was most

Table 5

Absolute knowledge in percent and mean degree of knowledge of the four concepts.

Concept	N (number)	%	Mean (SD – standard deviation)
Post-Growth (yes)	156	60.2	2.81 (1.31)
Term unknown (no)	103	39.8	
Green Growth (yes)	166	64.1	2.69 (1.29)
Term unknown (no)	93	35.9	
Degrowth (yes)	129	49.8	2.56 (1.18)
Term unknown (no)	130	50.2	
A-Growth (yes)	9	3.5	3.0 (1.58)
Term unknown (no)	250	96.5	

known, followed by post-growth and degrowth (Table 5). Only nine people knew a-growth, but of these eight knew all four terms. They might be rather knowledgeable about the concepts in total. The people who had answered 'yes' for the respective concept were asked to assess their own degree of knowledge on it and to write some bullet points to describe it. The self-assessed mean knowledge for post-growth was highest on a scale from one to six (6 = very good knowledge), excluding a-growth with only nine responses. However, the means do not vary much in size, ranging from 2.56 to 2.81.

The comments written to describe the concepts showed good insights of several respondents into the topic. Post-growth, green growth and degrowth were all criticised for different reasons by the UBA employees. There were more reservations about green growth, e.g. with references to greenwashing, than towards the other concepts. Across the different measures in this study, this criticism of green growth fits with the higher implicit approval of degrowth compared to green growth and the higher explicit approval of post-growth. The more pronounced critique of green growth in the comments seems to contradict the similar explicit approval of green growth and degrowth but not every participant who had written comments had also given his/her opinion on the concepts and vice versa. Those participants who criticised a concept in their comments usually judged it as worse than the other concepts, when they rated their explicit agreement. As a-growth was only described by nine people, no broad conclusions could be drawn but they described the idea behind the concept well.

Further, the participants were asked whether and to what extent they knew about UBA's recent report on the precautionary post-growth approach. The results are shown in Fig. 3 demonstrating that about half of the respondents did not know it at all.

All knowledge-related questions showed that many UBA employees lacked knowledge about the nexus between economic growth and environmental protection and especially about the theoretical concepts and foundations of the topic. A small majority knew the concepts (except for a-growth), but their overall rating of their knowledge was not high. The respondents who knew the report better and therefore were more knowledgeable about the precautionary post-growth approach were slightly more likely to agree with the position (Eta coefficient of $\eta = 0.22$).

People who knew several of the concepts (0 if none are known to 4 when all are known) were more likely to have an implicit position towards degrowth than those who knew no or few of the concepts ($\eta = 0.30$). Also, people who knew several concepts were likely to explicitly approve of post-growth ($\eta = 0.34$) while they showed an ambiguous picture regarding their approval of green growth ($\eta = 0.32$). For degrowth, the effect was rather unclear ($\eta = 0.09$), as well as for a-growth due to the small number of respondents ($\eta = 0.23$).

Further, respondents who stated that they knew post-growth were more likely to choose the implicit a-growth and degrowth answers in position choice. The effect was statistically significant but rather weak ($\phi = 0.24$, $p = .001$). Those who knew degrowth favoured a-growth and degrowth over green growth as well ($\phi = 0.28$, $p < .001$). Most people who knew green growth also implicitly preferred a-growth followed by degrowth while the answers were roughly equally split for those who did not know green growth ($\phi = 0.17$, $p = .025$). For explicit a-growth knowledge the result was again not significant due to the low number of respondents.

Hence, knowledge on the concepts seems to be related to attitudes on the concepts, indicating that more knowledgeable respondents tended to favour growth-critical concepts rather than green growth.

5. Discussion

We discuss our main results in this section (5.1) before comparing our findings to prior surveys (5.2). Additionally, we look at what our results indicate for the feasibility of growth-critical concepts (5.3) and explain the limitations to our research (5.4).

5.1. Discussion of main results

Our results show that the majority of the UBA employees had

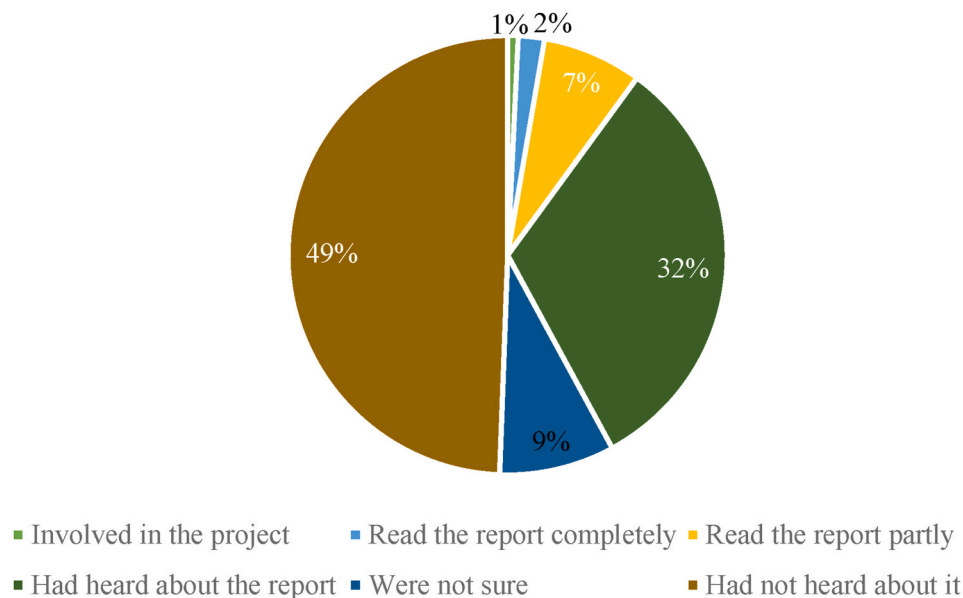


Fig. 3. Knowledge about the report presenting the precautionary post-growth approach.¹⁴
Source: Own depiction based on survey results.

favourable attitudes towards growth-critical concepts rather than towards green growth. A-growth was implicitly favoured over degrowth and green growth, although it was unknown to most explicitly. This demonstrates that the term is not widely known but the underlying concept seems to be intuitively appealing. However, it could also have been chosen so often due to being the middle option in position choice. When people show no strong preferences on the Likert scales, the middle position tends to prevail (Döring and Bortz, 2016) which could have increased the a-growth result in implicit position. Post-growth got the highest explicit approval but was not tested implicitly. It might be assumed that as many respondents did not know a-growth, they selected post-growth as a similar position in explicit approval, being the concept receiving the highest rating of agreement. As both concepts can convey similar ideas, a-growth/post-growth would be the favoured concept across all three attitude measures. In total, people in favour of post-growth were also likely to support degrowth, which was more accepted than green growth across the different measures.

This survey indicates a relation between knowledge and attitudes, given that people who know more about the growth vs. environment debate tend to move away from agreeing with green growth. However, the causality and exact effect could not be determined with correlation analyses. People with more growth critical attitudes could have informed themselves more about the topic thus increasing their knowledge. Or higher knowledge on the debate could make people more growth critical.

Overall, the knowledge of the UBA employees about the different concepts on economic growth and the environment leaves room for improvement. The respondents were probably already more interested in and knowledgeable about the growth debate than the employees who decided not to take or complete the survey. It remains to be seen how knowledge and attitudes relate on this topic but increasing knowledge on growth-critical concepts will probably benefit their acceptance amongst environmental specialists and beyond.

A central question in the interpretation of our results is which attitude measure is the best: There was a greater number of employees who favoured degrowth over green growth in the implicit tests, while the explicit approval of the terms was similar. It is plausible that the implicit approval is more reliable as no definitions were provided when asking about the terms explicitly. Some people therefore did not know the implications of the concepts properly and about half of the employees preferred not to give their opinions as they were unsure. Amongst the two implicit measures, position choice is probably better as the results were closer to explicit approval (smaller difference between degrowth and green growth) and as it was a direct question rather than an aggregation of the results of 16 statements. Some of these statements were supported across all clusters and not all were perfectly attributable to either green growth or degrowth as ends of the scale.

5.2. Findings compared to prior surveys

In the following, we compare our results on the attitudes of environmental specialists with former results regarding the attitudes of scientists and the public. Four factors seem to influence people's attitudes on growth-critical concepts across the surveys: knowledge, nationality, interdisciplinarity and, for economists, the theoretical paradigm they follow.

As the question on position choice was identically taken from Drews et al. (2019) which was used in Drews and van den Bergh (2017, 2016), their results can directly be compared to ours (Table 6). Overall, the UBA employees, as environmental protection specialists, were more growth-critical than other scientists and much more so than the Spanish

Table 6

Results of three different surveys measuring position choice in comparison.

Survey Results in %	Growth-at-all-costs	Green Growth	A-Growth	Degrowth
Spanish Public (Drews and van den Bergh, 2016)	4	59	21	15
International Scientists (Drews and van den Bergh, 2017)	1	42	31	17
UBA Employees (this article)	0	25	45	30

public. This could be related to the potentially higher knowledge that environmental specialists have compared to international multi-disciplinary scientists¹⁵ and especially compared to the Spanish public. Howard and Sylvan's work (2015) again indicates differences between economists and the general public which could be related to knowledge levels.

The attitudes of economists towards growth-critical concepts seem to depend on their orientation to ecology and the theoretical paradigm they follow. While neoclassical/environmental economists favoured green growth, ecological economists preferred degrowth in the study by Carattini and Tavoni (2016). Spash and Ryan (2012) showed that heterodox, environmental/resource, as well as ecological economists related differently to ecology. The strong links to ecology made by the ecological economists conflict with the pro-growth attitudes of other schools of thought. A-growth could have the potential to be a compromise and a position that also neoclassical economists can agree with. This is underlined by Haab and Whitehead (2017) who found support for a-growth amongst environmental and resource economists. A-growth can not only be a concept taken up by economists following different paradigms but also by scientists in general. A stronger pattern of agreement for a-growth was found for international scientists by Drews et al. (2019) in their LCA including more data than just the answers to the question above (Table 6). This aligns with the results from our survey amongst environmental specialists. There is also a parallel between our sample which was prone to growth-critical concepts and the growth-critical ecological economists (Spash and Ryan, 2012) as both groups are very inter- and transdisciplinary in their backgrounds and approaches (Cosme et al., 2017). Being interdisciplinary in contrast to having a pure economic point of view could be related to more ecologically oriented and growth-critical attitudes.

We find that our results relate to several findings from prior surveys: 1) They indicate a relationship between knowledge and attitudes on growth-critical concepts. 2) economists are more growth-critical when they follow economic paradigms which are not mainly neoclassical. 3) Interdisciplinarity could result in more growth-critical attitudes.

Next, we discuss if the implementation of such growth-critical concepts would be feasible.

5.3. Feasibility of growth-critical concepts

Large parts of society, not only among experts but also in the public, favour a-growth, as shown by Tomaselli et al. (2019) and Drews et al. (2019). A position close to a-growth such as the precautionary post-growth approach could therefore help to bridge gaps between the conflicting green growth and degrowth proponents. It could also align with the European Union whose environmental policies rest on the precautionary principle which first emerged in German law (Bourguignon, 2015). Such a concept could find its way into political decision-making as expert or scientific opinions often play a crucial role in policy-making (Javeline et al., 2013). An open position can more

¹⁵ This group includes economists, social scientists, and natural scientists as described in section 2.2 of this paper and in the study by Drews and van den Bergh (2017).

easily be conveyed to the public, as the more radical image of degrowth is more negatively connoted than other terms such as post-growth (Drews and Reese, 2018). As the precautionary post-growth approach itself is a compromise between different disciplines and different economic paradigms on growth and the environment (Petschow et al., 2020), it could help researchers work with and appreciate growth-critical concepts.

The prospect of further developing such a-growth/post-growth positions is also reflected in the desire of UBA employees to work on this issue in the future. According to the survey, the employees want the UBA to expand its engagement in the growth debate because they see it as crucial for environmental protection in general and in many cases for their own work. They largely approve of the precautionary post-growth approach and are therefore likely to support the introduction of this or a similar concept for the agency. The choice of a more open position, as represented by a-growth and the precautionary post-growth approach, could be a useful stance for public entities such as national environmental agencies and ministries as, according to our survey, environmental specialists tend to support these concepts.

5.4. Limitations

The research design entails some limitations. There might be issues related to missing responses, i.e. people in the sample who did not answer or complete the survey, which can lead to a non-response bias (Berinsky, 2008; Hurland et al., 2018). As there was no obligation to take the survey, there can be a selection bias (Bethlehem, 2010). However, the survey sample is quite representative of the UBA employees regarding central socio-economic variables (see section 3.1).

Furthermore, the blurred line between a-growth, post-growth and degrowth as described in section 2.1 may have caused confusion amongst the respondents. Post-growth was sometimes understood as being closer to an a-growth position (as in the precautionary post-growth approach) or to a degrowth position (when the terms are used synonymously) and thus could not clearly be separated. As the understanding of the positions can be overlapping, the high agreement on post-growth could entail positive votes for degrowth or a-growth.

There was an apparent contradiction because several a-growth and degrowth positioned respondents agreed with the explicit concept of green growth. This can result from the fact that no definition of the concepts was provided so that the evaluation was based on people's own knowledge, or that there is an inherent lack of clear theoretical boundaries between the various concepts. Furthermore, the agreement could result from the fact that some of the concepts' ideas – such as stopping current subsidies for ecologically harmful industries – are similar so that partial approval of other concepts is possible. Additionally, the concept of growth might be so engrained in people's minds that they are confused about adding prefixes such as a- or de- to the word.

6. Conclusion and further research

Our findings indicate that experts dealing regularly with environmental and ecological topics tend to reject green growth while being inclined towards growth-critical concepts, i.e. a-growth, post-growth and degrowth. Higher knowledge about the conflict between growth and the environment are related to an approval of growth-critical concepts coupled with stronger scepticism about green growth. The causality and relationship between knowledge and attitudes on these concepts should be studied more extensively in the future. According to our research, moderate concepts like a-growth or the precautionary post-growth approach have the potential to be accepted and endorsed both by scientists and environmental specialists, as well as the public.

To validate the findings of our quantitative study and gain deeper insights, a qualitative follow-up study could be helpful. Further research on people's and experts' attitudes towards concepts on growth and environment would help to better understand what could be socially and

politically feasible. Here a focus on certain target groups such as scientists and political decision-makers can be particularly insightful. For example, our present survey could be duplicated among environmental specialists outside the UBA to show whether the results are generalizable. Future surveys could also be conducted with national environmental agencies of other countries, with interdisciplinary scientists and with the public in several countries, including Germany.

We believe that this research and subsequent similar research can contribute to further refining and articulating the precautionary post-growth approach. It would be interesting to investigate whether a-growth and/or the precautionary post-growth approach receive similarly high approval by scientists and environmental specialists in other countries. Apart from Jackson's research (2020) for the United Kingdom, the precautionary post-growth approach has not found any strong resonance outside of Germany so far.

Finally, this research spurs hope for building a post-growth society, given that such ideas appear to resonate with environmental specialists who are crucial actors in the pursuit of environmental sustainability. This result should motivate not only scientists but also policy-makers and other decision-makers in society to consider strategies beyond green growth, as the support in the public and among experts is provided.

CRediT authorship contribution statement

Cathérine Lehmann: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Visualization, Project administration. **Olivier Delbard:** Writing – original draft, Writing – review & editing, Supervision. **Steffen Lange:** Writing – original draft, Writing – review & editing, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Survey Questionnaire

A) Position Statements

In the following, you see different statements. Please indicate in how far you agree with the statements.

„Economic growth“ is defined as growth of the Gross Domestic Product (GDP) on this page. The statements refer to rich industrialized countries.

See statements in table 2

Answer possibilities: strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, strongly agree

B) Position Choice

Here are several positions on the relation between economic

growth and the environment. Which of them is closest to your own opinion?

„Economic growth“ is defined as growth of the Gross Domestic Product (GDP) on this page. The statements refer to rich industrialized countries.

Public policy in rich industrialized countries should...

- 1) further pursue economic growth in spite of its environmental impacts.
- 2) further pursue economic growth. There are many ways to make economic growth compatible with environmental sustainability.
- 3) ignore economic growth as a policy aim, that is, be completely neutral about growth. This will amplify the policy spectrum to combine well-being and environmental sustainability goals.
- 4) stop pursuing economic growth. Production and consumption need to be downscaled in an equitable way to achieve environmental sustainability.

One option can be selected

C) Knowledge of the four Concepts

1. In the following, you will be asked about the terms ‚Post-growth‘, ‚Green Growth‘, ‚Degrowth‘ and ‚A-Growth‘. Have you heard about the term ‚Post-growth (society)‘ before this survey?

Answer possibilities: yes, no; for no, logic jump to question 4

2. Which associations regarding ‚Post-growth‘ spontaneously come to your mind? (2 to maximum 5 bullet points)

Open text

3. How well do you know the concept of ‚Post-growth‘?

Please choose 1 when you rarely know the concept and 6 when you know it very well. By putting one of the numbers in-between you can adjust your response more accurately according to your personal knowledge.

Answer possibilities: rarely (1), 2, 3, 4, 5, very well (6)

4. Have you heard about the term ‚Green Growth‘ before this survey?

Answer possibilities: yes, no; for no, logic jump to question 7

5. Which associations regarding ‚Green Growth‘ spontaneously come to your mind? (2 to maximum 5 bullet points)

Open text

6. How well do you know the concept of ‚Green Growth‘?

Please choose 1 when you rarely know the concept and 6 when you know it very well. By putting one of the numbers in-between you can adjust your response more accurately according to your personal knowledge.

Answer possibilities: rarely (1), 2, 3, 4, 5, very well (6)

7. Have you heard about the term ‚Degrowth‘ before this survey?

Answer possibilities: yes, no; for no, logic jump to question 9

8. Which associations regarding ‚Degrowth‘ spontaneously come to your mind? (2 to maximum 5 bullet points)

Open text

9. How well do you know the concept of ‚Degrowth‘?

Please choose 1 when you rarely know the concept and 6 when you know it very well. By putting one of the numbers in-between you can adjust your response more accurately according to your personal knowledge.

10. Have you heard about the term ‚A-Growth‘ before this survey?

Answer possibilities: yes, no; for no, logic jump to next section

11. Which associations regarding ‚A-Growth‘ spontaneously come to your mind? (2 to maximum 5 bullet points)

Open text

12. How well do you know the concept of ‚A-Growth‘?

Please choose 1 when you rarely know the concept and 6 when you know it very well. By putting one of the numbers in-between you can adjust your response more accurately according to your personal knowledge.

Answer possibilities: rarely (1), 2, 3, 4, 5, very well (6)

D) Explicit Approval

Please indicate in how far you agree with the concepts.

- 1) Post-growth
- 2) Green Growth
- 3) Degrowth
- 4) A-growth

Answer possibilities: strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, strongly agree | I cannot assess this

E) Knowledge of Precautionary Post-Growth

Do you know the following report which was published by the UBA: „Social well-being within planetary boundaries: The precautionary post-growth approach“?

<https://www.umweltbundesamt.de/publikationen/vorsorgeorientierte-postwachstumsposition>

Please choose one of the following options.

- 1) I was involved in its creation/ the project
- 2) I have completely read it
- 3) I have partly read it
- 4) I have heard about it
- 5) I have not never heard about it
- 6) I am not sure

F) Summary and Agreement with Precautionary Post-Growth

Please read in the following attentively the summary of the „precautionary post-growth position“ which is based on the before mentioned report. The excerpt is a paraphrasing of page 157 in the report.

The authors develop an own position in this report, the so-called „precautionary post-growth approach“.

Its goal is to transform societal institutions such as social security systems and the education system in a precautionary manner so that they can deliver their function (more) independently from economic output. Through a stronger growth

independence, a high scale of social well-being could be maintained even with stagnant or shrinking economic performance. Politics could design necessary (environmental) policy measures more independently from their allegedly negative effects on economic growth. Environmental policy measures would be less subject to the "growth premise".

The developed position, contrary to Green Growth and Degrowth, is with an open outcome.

It does not say that the economy can grow further. It does not make a statement, if sufficient decoupling between economic output and emissions respectively resource consumption is possible (Green Growth).

It also does not say that the economy has to shrink and that such a decoupling of economic growth and resource use is impossible (Degrowth).

The authors draw the conclusion: We do not know how economic performance will develop when economic activities in rich countries are fundamentally transformed to be aligned with global ecological goals. However, it is possible or probable that economic output would stop growing or even shrink significantly in the context of this ecological transformation.

After reading this summary of the precautionary post-growth approach, please evaluate all the following statements:

As background: The report was published by the UBA but made by external authors. It does not represent an explicit positioning of the UBA.

- 1) I agree with this position based on my knowledge.
- 2) I would like to learn more about this position.
- 3) I think that such a basic economic position is relevant for the environmental topics I am working on.

Answer possibilities: strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, strongly agree | I don't know

G) Agreement with Key Requirements & Interest in the Topic

See statements in table 4

Answer possibilities: strongly disagree, disagree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, strongly agree | I don't know

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