Exploring the possibility of linking and incorporating Future Design in Backcasting and Scenario Planning

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Abstract

There are two approaches to future planning: backcasting and scenario planning. While some studies have attempted to relate and combine these two approaches, a future design (FD) approach has recently been advocated and researched. Given this state of affairs, the paper provides an overview of the FD approach and discusses the potential benefits of linking and incorporating it into backcasting and scenario planning by summarizing the main features of such benefits for future planning for sustainability. A feature of an FD is that it explicitly orients people's ways of thinking in the current generation to be generative for not only their own future but also generations to come, as well as in designing a plan within a coherent timeframe by demonstrating the characteristics of being prospective and retrospective from the viewpoint of a different generation. Another feature of FD lies in strategy making through some visioning process and in redefining the boundary between what is controllable and what is uncontrollable by considering the perspectives of future generations. We consider this article as a concept paper for the special issue of "Designing Sustainable Future Societies," building on a literature review and author's conceptual framework. Thus, our ideas and concepts suggest some potential benefits from incorporating FD into backcasting and scenario planning, further inducing people to be future-oriented and/or sustainable in terms of strategy making. We finally demonstrate some examples of FD practices and illustrative ideas of FD incorporation, remarking on possible avenues for future research.

Key Words: Sustainability; future generations; future design approach; visioning

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1 Introduction

There are two main approaches to future planning, namely, backcasting and scenario planning, and they have become standard practices in a wide variety of areas, such as business, the economy and society. These approaches are seen as alternatives to traditional planning methods such as those that are tactical and contingent. Moreover, these approaches are now considered useful for future strategic initiatives and planning in dealing with complex and uncertain problems, especially when environmental and societal transitions are expected to be made very swiftly (Bibri, 2018). Backcasting and scenario planning are gaining popularity due to their broad scope and consideration of a long time horizon, possibly providing different directions and options for the future. Conversely, a future design (FD) approach has recently been advocated and researched. This approach can be considered a new element or member, potentially being linked to and incorporated into backcasting and scenario planning for sustainability (Shahrier et al., 2017a, Timilsina et al., 2021, 2019b, Nakagawa et al., 2019a,b, Timilsina et al., 2019a, Shahen et al., 2020a, Saijo, 2020, Shahen et al., 2020b). This paper reviews some main features of the three approaches to future planning for sustainability and explores some possibilities of linking and incorporating FD into the existing approaches.

Backcasting is defined as an approach to future planning in which people discuss, set a desirable future and then work backward to identify what measures or actions are required to achieve the end goal, such as prioritizing sustainability in society (Dreborg, 1996, Wiek and Iwaniec, 2014, McPhearson et al., 2016). The backcasting approach proposed by Robinson begins with the use of normative visioning as a methodology for attaining future goals (Robinson, 1990, Robinson et al., 2011). This approach articulates the importance of discussions about the possible changes that may occur in the future and the decisions that may be made under certain restrictions and constraints (Phdungsilp, 2011). Backcasting has been actively applied in social contexts, such as business planning and environmental policy, spanning energy and natural resource management, urban development and future education (Weddfelt et al., 2016, Gering et al., 2018, Bibri and Krogstie, 2019, Pereverza et al., 2019, Sandstrom et al., 2020). In general, backcasting studies can

be classified into expert-based, participative and interactive. The main focus of the expert-based backcasting is on technical analysis and future policy recommendations through experts' opinions in a top-down manner, whereas the two other types of backcasting place more emphasis on defining future images or visioning in a bottom-up manner (Carlsson-Kanyama et al., 2008, Barrella and Amekudzi, 2011).

Scenario planning is defined as an approach for thinking about strategy for future planning and management within an organization. In this approach, people in an organization are asked to think about future uncertainties by (i) imagining potential and possible scenarios that are often built upon some scientific understanding of existing conditions and trends and (ii) considering and/or choosing the best future plan and strategies from the scenarios (Wack, 1985, Lindgren and Bandhold, 2002, Bradfield et al., 2005, Borjeson et al., 2006, Bai et al., 2015). Scenario planning was introduced in 1971 by Pierre Wack and has been used by several large companies, such as Dutch Royal Shell, DHL Express and General Electric (Wack, 1985). Moreover, scenario planning is considered a practical approach that is extensively used by business organizations in private sectors to build critical strategies to be adopted by considering multiple future scenarios at the time of high uncertainty (Muhammad et al., 2013). Overall, scenario planning is considered useful for helping organizations adopt sociotechnical and environmental changes by logically reasoning that future scenarios are a basis for new management and policy strategies. However, it is often claimed that there is no clear distinction between backcasting and scenario planning, as they are sometimes implemented simultaneously in a mixed manner (Kok et al., 2011).

Some earlier studies, on the one hand, have attempted to combine backcasting and scenario planning, where the common objective in both approaches is strategy making for future planning (Barrella and Amekudzi, 2011, Dassen et al., 2012, Vliet and Kok, 2015). On the other hand, a few previous works have proposed new types of backcasting and scenario planning that are different from the conventional ones, such as participative and interactive types (Carlsson-Kanyama et al., 2008). These new types of backcasting and scenario planning are proposed to fulfill some of the shortcomings of conventional methods. For instance, sustainability problems are complex,

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requiring practical, qualitative and scientific assessments from different viewpoints to analyze long-term future states and making strategies. New types of backcasting and scenario planning may be better options because they seek to enable various assessments in the processes by involving not only real stakeholders but also experts in an interactive way (Geurs and van Wee, 2004, Barrella and Amekudzi, 2011). The objective of this paper is to generate better strategies with assessments from various viewpoints by engaging local participants, along with expert panels, in deliberation about sustainable development from a long-term perspective.

Visioning is a crucial element among backcasting, scenario planning and FD for future planning. The extant studies on foresight and future studies aim to understand the visioning process by conducting assessments. Constanza (2000) and Weaver and Rotmans (2006) create and assess shared visions for policy development through consensus among stakeholders. Wiek and Binder (2005) and Potschin et al. (2010) develop the sustainability solution space methodology for evaluating visions' coherence and perform consistency checks by developing visioning methods, such as sustainability choice space. Okubo (2000) conducts community visioning through public engagement by placing particular emphasis on the tangibility and relevancy of such visions. Visioning is also used in backcasting and FD, while scenario planning considers visioning as a subset of scenarios (Wiek and Iwaniec, 2014). Overall, these studies appear to suggest that effective future planning should employ visioning methods to be comprehensive, robust and agreed upon via consensus among participants.

The feature of an FD, in practice, is explicitly orienting people's ways of thinking in the current generation to be generative for not only their own future but also generations to come as well as in designing the plan within a coherent timeframe by being prospective and retrospective from the viewpoint of a different generation. Another feature of FD lies in strategy making through some visioning process and in redefining the boundary between what is controllable and what is uncontrollable by considering the perspectives of future generations. We consider this article as a concept paper for the special issue of "Designing Sustainable Future Societies," building on a literature review and our own conceptual framework. Thus, our ideas and concepts suggest

some potential benefits of incorporating FD features into backcasting and scenario planning as a new element, further inducing people to be future-oriented and/or sustainable for strategy making. To this end, we provide an overview of the FD approach and summarize its main features for future planning for sustainability. We suggest the potential benefits of linking and incorporating FD into the practices of backcasting and scenario planning, further inducing people to be future-oriented and/or sustainable for strategy making in terms of future planning to sustainability. We finally demonstrate some examples of FD practices and illustrative ideas of FD incorporation for backcasting and scenario planning, remarking on avenues for future research.

2 An overview of the FD approach

Most approaches in contemporary future studies seek to orient stakeholders and scientists to codesign research projects, coproduce knowledge and codeliver results for sustainability via future planning from the perspective of the current generation (Saijo, 2020). However, in such existing approaches, the perspectives of future generations have been broadly missing and ignored. Therefore, Japanese economist Tatsuyoshi Saijo introduces the concept of "FD" that implements some mechanisms or institutions for people to consider the perspectives of future generations as a new feature in future planning and strategy making. This approach attempts to account for how people's ways of thinking, preferences and behaviors can change to become future-oriented and/or sustainable by introducing FD through scientific research and real practice in Japanese communities, municipalities and abroad (Saijo, 2019). The FD approach can be considered a new attempt by institutions and practices to redesign future societies.

FD has some standard procedures for its implementation in both research and practice. As a first step, people consider the viewpoint of the current generation, and then, FD implements some mechanism or institution for people to consider the perspectives of future generations, as a type of perspective-taking procedure by which people can expand their ways of thinking and viewpoints not only from their own perspectives but also from those of future generations, as illustrated in

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Table 1. As in the second, third and fourth steps, FD induces people to view what happened in the past, what might happen in the future (positive visioning) and desirable future states (normative visioning) from the perspectives of different generations and then think about future planning and management strategies (see Table 2 and Figure 1). In these steps, people consider themselves real agents or actors for problem identification and solving. Because people are induced to employ positive and normative visioning along with problem identification and solving by themselves, another feature of FD is that it combines both positive and normative visioning in a bottom-up manner (see Figure 2). Overall, through these steps, FD seeks to explicitly orient people's ways of thinking, preferences and behaviors in the current generation to be generative not only for their own future but also for generations to come, as well as to redefine the boundary between what is controllable and uncontrollable by considering the perspectives of future generations (Saijo, 2019, Nakagawa et al., 2019b,a).

There have been several different FD mechanisms and institutions for perspective taking in terms of the perspectives of future generations and for expanding the ways in which people think about future planning (Kamijo et al., 2017, Shahrier et al., 2017b,a, Timilsina et al., 2021, 2019a,b). The first institution is an imaginary future generation (IFG), in which some participants in FD are asked to be part of an imaginary future generation and negotiate with the current generation to identify problems and solutions (Kamijo et al., 2017). The second is called the future-ahead-and-back (FAB) mechanism, where people in the current generation are asked to consider the perspectives of future generations from which they discuss what they may want the current generation to do; then, they return to their original position in the current generation and have discussions to make the final policy agenda or decision (Shahrier et al., 2017a). The third is the intergenerational accountability (IA) mechanism, where people in the current generation are asked to provide the reasons behind their decision and their advice to future generations, which shall be kept as an account for future generations' reference (Timilsina et al., 2019a). These FD mechanisms and institutions have been scientifically studied through research and practice to verify the effectiveness and orientation changes of people's ways of thinking, preferences and behaviors. Additional details

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of such FD research and practices are discussed below.

In the domain of scientific research, several lab and field experiments have been conducted in Japan and abroad. Kamijo et al. (2017) have coined the game and term "intergenerational sustainability dilemma game (ISDG)", in which a sequence of six generations, each composed of three people, is organized, and each generation is asked to choose whether to maintain intergenerational sustainability (sustainable option) or maximize its payoff by irreversibly imposing costs on future generations (unsustainable option). Kamijo et al. (2017) and Shahrier et al. (2017b) have pioneered experiments in the laboratory with Japanese students and in the fields of Bangladesh and in rural and urban areas with general community people, respectively. Similarly, Timilsina et al. (2021, 2019a,b) conduct field experiments in Nepalese rural and urban areas. Timilsina et al. (2021, 2019a,b) and Shahrier et al. (2017b,a) have confirmed that urban people choose to be unsustainable in the absence of FD mechanisms such as FAB and IA, demonstrating that unplanned rapid modernization with a higher degree of capitalism and competition might have made people more proself and short-sighted in the urban areas of these countries. However, they also find that FD mechanisms (IFG, FAB and IA) successfully induce people to choose to be sustainable to uphold intergenerational sustainability, arguing that they tend to feel empathy toward future generations (Kamijo et al., 2017, Shahrier et al., 2017a, Timilsina et al., 2019a). Shahen et al. (2020a) conduct one-person ISDG laboratory experiments with a pool of Japanese students, identifying that individuals act selfishly and choose to be unsustainable without considering future generations in the absence of FD mechanisms, even when intergenerational sustainability is highly threatened. However, the FAB mechanism is effective at inducing an individual to choose being sustainable by triggering cognitive dissonance, enhancing intergenerational sustainability in a one-person setting. Overall, these scientific studies have established that people's ways of thinking, preferences and behaviors can be affected by FD interventions or perspective-taking procedures to enhance sustainability for future generations.

Several researchers have conducted practices and implementations of the FD approach to resolve real social issues such as financial sustainability, forestry management and waste management by

utilizing public deliberation workshops in several municipalities in Japan and abroad (Nakagawa et al., 2017). In such workshops, participants are asked to consider themselves people who will be living 30 years later to consider the perspectives of future generations and to think about the social issues in their discussions from such perspectives. For instance, Nakagawa et al. (2019a,b) implement FD deliberation workshops in some municipalities of Japan to identify public attitudes toward financial sustainability and forestry management; they confirmed that individual policy preferences change to being future-oriented and sustainable in future planning via FD interventions, such as inducing participants to understand how people in future generations may view what happens in the current generation (see Nakagawa et al. (2019a,b) for the details of the FD intervention procedures). Hara et al. (2019) organize FD workshops in some municipalities of Japan with IFG treatment by asking some people in a group to be representative of future generations, finding that IFG helps solve not only the current problems but also some other salient issues associated with future generations. Similarly, Nakagawa (2020) have claimed that FD intervention facilitates insight problem solving through constraint relaxation and paradoxical thinking, generating sustainable solutions. Overall, the robustness and replicability of FD effectiveness have been confirmed through several economic experiments and real practices in laboratories, fields and workshops, with different contexts, cultural backgrounds and countries.

[Figure 1 about here.]

[Table 1 about here.]

[Table 2 about here.]

3   The potential benefits of linking and incorporating FD into backcasting and scenario planning

In both scientific research and practice, visioning is identified as a fundamental aspect of FD to orient people's ways of thinking, preferences and behavior toward future generations. FD uses both

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positive and normative visioning as a methodology for future planning by narrative deliberation by the public. Drawing on earlier studies such as those of Collins and Porras (1996), Sally (2000) and McPhearson et al. (2016), the present study defines positive visioning as a process in which people imagine and anticipate plausible or possible future situations and events (what may happen in the future). Moreover, following the works of Constanza (2000) and Wiek and Iwaniec (2014), we define normative visioning as a process in which people think about the desirable future states that they want to achieve via their aspirations, followed by deliberation, evaluation and assessment (desirable future). Table 2 summarizes some typical features of these two approaches to visioning. Positive and normative visioning practices in FD are considered important because they are applied to induce people in the current generation to consider different perspectives in a coherent time frame, generation by generation (experiencing or role playing in terms of the past and future). In other words, FD uses positive and normative visioning in a bottom-up manner, where people in the current generation are induced to vision what happened, what may happen and desirable future states in prospective and retrospective timeframes to identify and analyze problem decisions for the future (Nakagawa et al., 2019b,a). In this sense, FD is considered to take a holistic approach because people can freely vision for the future based on hands-on life experiences, knowledge and sociocultural norms. In Figure 2, we illustrate that public participation is also the core of the FD approach, providing freedom for public deliberation (Saijo, 2020, Nakagawa, 2020).

Backcasting often seeks normative visions through introspection and works backward from that particular vision's endpoint to create strategies. Scenario planning develops organizational strategies by investigating external uncertainty for future planning. Scenario planning is mostly practiced without having collective visioning processes (Wiek and Iwaniec, 2014). Backcasting starts with the setting of criteria for social goals, while scenario planning begins with environmental analyses of the critical factors to determine the nature of the future environment, i.e., drivers for future changes. The participative and interactive backcasting and scenario planning methods are advocated by Carlsson-Kanyama et al. (2008) and Geurs and van Wee (2004) and use the four steps illustrated in Table 1. In such methods, both backcasting and scenario planning are used together

and/or combined to address sustainability problems in future planning (Barrella and Amekudzi, 2011, Dassen et al., 2012, Vliet and Kok, 2015). Overall, visioning in backcasting and scenario planning is implemented from the viewpoint of the current generation, while some studies suggest some potential benefits from introducing some new visioning practices, such as that developed by Carlsson-Kanyama et al. (2008).

FD defines a time path or timeframe for perspective-taking processes in visioning from the perspectives of different generations, and this feature is different from visioning practices and some steps in backcasting and scenario planning (see Figure 2). The procedures of retrospective and prospective perspective-taking practices are summarized in Figure 1. We illustrate how people in the current generation exercise visioning by experiencing the past and future to identify common sense (values) to bind themselves when some aspects of technology, culture and social norms may change (or not) over time. For instance, we ask people to think about technologies, cultures and practices that have existed but are not present in the current period or that will disappear in the future or technologies, cultures and practices that have never existed in the past but have emerged in the present or will emerge in the future. Thus, in FD, people are asked to identify what may remain or disappear over time as technologies, cultures and practices, as core values of society, change via visioning, supporting people in expanding their ways of thinking about the future. In this sense, it is argued that FD is considered a practice of insightful problem solving (IPS) that may bring about creative solutions for many critical problems (Nakagawa, 2020).

Along with visioning, the strategy-making process in FD can be considered endogenized because participants are induced to create pathways for achieving the vision set by themselves through visioning and deliberation during workshops. At the same time, experts and professionals are present and asked to focus on providing facts and information regarding the issues of interest. Therefore, the FD approach is one way for people to voluntarily identify the problems and solutions that influence both the current and future generations. Specifically, FD does not start by specifying endogenous and exogenous factors in its research and practice, taking care not to control people's ways of thinking, preferences and behaviors but to expand them in future planning. In summary, in FD, participants are

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invited to think about making strategies or pathways to achieve visions by redefining the boundary between what is controllable (endogenous factors) and what is uncontrollable (exogenous factors) from the perspectives of different generations for future planning.

In summary, we have identified that FD has two features, i.e., its visioning practice and strategy-making process, which can be considered distinct from the practices and procedures of backcasting and scenario planning. Based on research and practice, FD mechanisms and practices are said to successfully induce people to be future-oriented and sustainable by triggering cognitive dissonance, empathy for future generations, expansions of their ways of thinking and paradoxical thinking (Konow, 2000, Cooper, 2007, Shahrier et al., 2017a, Timilsina et al., 2021, 2019b, Nakagawa et al., 2019a,b, Timilsina et al., 2019a, Shahen et al., 2020a, Saijo, 2020, Shahen et al., 2020b). Given this state of affairs, we suggest that linking and incorporating FD into some practices of backcasting and scenario planning are possible along with some potential benefits in that some important sustainable problems can be usefully analyzed (Gibson et al., 2005). Considering the bigger picture, FD, backcasting and scenario planning can be considered as sharing the same goals, i.e., strategy making for future planning for sustainability and the linking and incorporating of FD into some practices and procedures of backcasting and scenario planning are expected to further induce people to be future-oriented and sustainable in future planning for sustainability. In the next section, we will illustrate how FD interventions and practices can be linked and incorporated in existing backcasting and scenario planning approaches by introducing some examples.

4 Introducing illustrative examples of FD

This section provides illustrative examples of how to incorporate and link FD with backcasting and scenario planning. Nakagawa (2020) reports the results of a series of workshops conducted in a municipality of Japan on the issue of public water supply management. A bureau of city X in Japan, which is responsible for water supply management, implemented a training program with FD. Nine young (20–40 years; $M = 30.2$; $SD = 7.1$) volunteer officers (six males and three females)

were recruited, and a series of seven workshops were implemented from December 2018 to March 2019. The nine participants were divided into two groups (A and B). Groups A and B consisted of five and four participants, respectively, and their membership did not change throughout the seven workshops. Both groups deliberated and reached a consensus as to the state of water supply management 30 years in the future (i.e., 2019 + 30 = 2049). Regarding group A, on the basis of the summarization of the deliberation by Nakagawa (2020), the following vision is extracted: "In the year 2049, the city has overcome brand loyalty toward the groundwater resource that the city used to have and is now recycling used water to save scarce water resources. Furthermore, the city is implementing water supply management in collaboration with neighboring municipalities to distribute a limited amount of water optimally by overcoming territorial awareness that used to prevail among municipalities in 2019."

The deliberation process of this group, as summarized in Figure 1 of Nakagawa Nakagawa (2020), shows how the visioning process by imaginary future generations takes on the characteristics referred to in the Introduction section. In fact, in the earlier phase of deliberation, a group member doubted the status quo as of 2019 by hypothesizing that the treated wastewater is again consumed as drinkable water. While this is a rational vision in a city with scarce water resources, it has the potential to be emotionally rejected by the present generation (i.e., those living in 2019). Group members were fully aware of this rejection (see item 12 of Figure 1 in (Nakagawa, 2020)). If they did not consider the perspectives of future generations, then they must have regarded the reactions of the public as an uncontrollable factor and thus found this idea to be infeasible. However, instead of doing so, they assumed that such a radical idea had been realized and then considered the process of such realization (see item 14 of Figure 1 (Nakagawa, 2020)). Specifically, they interpreted that the potential rejection was partly ascribed to the fact that the people in the present generation used to have strong brand loyalty toward the groundwater and considered that this awareness could have been modified.

In group, B, the same city's future was discussed from a different angle. On the basis of the summarization of the deliberation by Nakagawa (2020), the following vision is extracted:

"The city is distributing undrinkable medium-quality water with low cost and fewer staff, and it is the responsibility of the households to purify the water for drinking purposes. For other purposes, they directly use distributed water. Taken together with the trend of Private Finance Initiative (PFI), this change enhances the speed of the slimming down of the water distribution management sector of the municipal government." This group also doubted the status quo as of 2019 by hypothesizing that the city (and the entire country) was distributing drinkable high-quality water to households at high costs. This vision seemed desirable considering that the distribution system would never be sustainable with the declining population and aging water pipe system. Initially, this vision was considered unfeasible because it was a form of common sense shared among the public with drinkable water.

Similar to group A, members in group B were fully aware of this rejection (see item 18 of Figure 2 in Nakagawa (2020)). The people in the present generation must have rejected this because it was taken for granted that water was supplied by public works. Thus, if they did not consider the perspectives of future generations, then they must have regarded the reactions of the public as an uncontrollable factor and thus found this idea to be infeasible. However, group members started speculating as to how such a seemingly infeasible idea was realized. See items 20, 21 and 29 of Figure 2 in Nakagawa (2020) for details. To summarize these two groups, the authors created desirable visions by doubting and denying the status quo of 2019 in such a way that it was beneficial for themselves as a future generation. Such visions seem neither possible nor probable, at least from the perspective of the present generation, and group members gradually shared the understanding that they are possible and probable, perhaps by discounting the cost of overcoming the hurdles hampering such realization. This discounting must have been possible because it was not they themselves as a future generation who had to share the cost, enabling them to view what seemed uncontrollable from a different angle.

To the best of our knowledge, Nakagawa (2020) is the only study comprehensively reporting on the deliberation process of an FD workshop, and thus, it is difficult to confirm the generalization of the above discussions. However, the authors observed similar group deliberations in city Y in Nepal.

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Specifically, in 2019, we invited local experts and officers of this city engaged in waste management and allocated the nearly 20 participants into groups, with each group consisting of 4 people. From the viewpoint of the generation in 2049, they created visions of the waste management of city Y. Eventually, participants assumed that the world in which they lived was not to be realized as an extension of the status quo policies. In one group, participants understood that garbage collection by vehicles should not be taken for granted, as it creates air and noise pollution and defined the problem to be considered as how the city could be waste-free rather than how environmental damage could be minimized.

In the above illustrative examples, we have detailed how FD workshops can influence people to create visions and doubt their status quo situations, and now, we suggest some possibilities for linking and incorporating FD into backcasting and scenario planning. Table 1 summarizes the general procedures for participative and interactive backcasting, prospective scenario planning and FD. There are a total of 4 steps that seek to support the procedures, such as the initial visioning step, gap identification step, goal formation step and strategy-pathway step. The initial visioning step is common among all three approaches, where some visioning practice is done that is either normative or positive from the viewpoint of the current generation. In the gap identification step, a gap is identified between the desired future state through "visioning" and the current state, and this step is also considered common among the three approaches. In the goal formation step, all three approaches use different methods, and we suggest that some FD practices be incorporated into backcasting and scenario planning in this step. In participative and interactive backcasting, vision development is performed from the viewpoint of the current generation, and we propose that such development can also be made from the perspectives of both the current and future generations. If vision is explicitly considered from the perspectives of future generations, even in backcasting, then it is expected that participants will look at vision from a different angle as if they create "history" rather than "future events." In scenario planning (the goal formation step), scenario analysis is conducted among participants from the viewpoint of the current generation, and we propose that such analysis can be done from the perspectives of future generations as well. We expect that

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scenarios developed from the perspectives of future generations will be more detached from the status quo, spanning a wider variety of possible states by questioning uncertain future events, compared with those developed from the viewpoint of the current generation by reconsidering controllable and uncontrollable factors.

We explain how FD can be incorporated into backcasting and scenario planning utilizing the conceptual framework with four steps in Table 1, clarifying a practical perspective as to how three approaches are related to each other. We name these four steps to summarize their processes, objectives and characteristics, offering a structure with some room for introducing FD practices in the goal formation step of backcasting and scenario planning. As a consequence of incorporating FD into the goal formation step, we conjecture that such an FD introduction will enrich vision and scenarios for future planning, inducing participants to experience some changes or "Aha! moments" to be more future-oriented and sustainable. In backcasting and scenario planning along with FD, participants may be able to create more robust strategy-pathway making and/or more flexible future planning actions than those without FD, possibly through cognitive dissonance, empathy for future generations, expansions in their ways of thinking, paradoxical thinking and constraint relaxation. Overall, the contribution of this article is that it proposes some ideas and concepts for how FD can be incorporated into participative and interactive backcasting and scenario planning on the basis of the FD literature. As suggested by Robinson (1988), socioeconomic planning should be oriented toward future generations; thus, it is crucial to test different visions rather than just predictions of the most likely future. Drawing on some ideas and concepts discussed for the three approaches and the steps in Table 1, we hope that future research will be able to identify the core values, vision and strategy of our humanity for sustainability, imagining and considering the perspectives of future generations explicitly rather than thinking only of oneself.

There are infinite ways to doubt and deny what is taken for granted in present society to create a future vision. It is challenging to perceive that the problems in the present society can be resolved by choosing one strategy. Choosing one of several methods is highly dependent on individual values, and it is not easy to reach a consensus on vision. Despite this, we have surprisingly observed

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how people have naturally come to a consensus on the desirableness and probability of vision in FD workshops, as in the above illustrative examples. However, the present study and existing literature on FD do not clarify the detailed processes of how individuals reach consensus on such a highly ideological matter when they consider the perspectives of future generations. Although the present study proposes potential benefits of incorporating FD into backcasting and scenario planning, we admit that such benefits have not been empirically established. Future studies should be able to address the impact of FD introduction or different impacts among the three approaches on vision, scenarios and strategy making by experimentation. These caveats notwithstanding, we believe that this work is an initial step in suggesting possible FD contributions in future planning for sustainability.

5 Discussion & conclusion

Visioning can serve as a guide to meeting normative goals for societies. We can say "people or societies live well" when they decide to do something of their own will, motivation or preference to be achieved and materialized in the future. In other words, it is also equivalent to saying that the initial stage of "living well" starts by creating a vision that can be a nice story for the future. In contemporary societies, each individual is able to create a personal life story based on his/her will, motivations and preferences, especially when he/she is economically successful. Why do people pursue a different job or even undertake a risky business? The answer is because they have some vision along with a story, and they want their own life to have meaning. Then, the next question is as follows: "Can societies or a group of people have a shared vision along with a story for sustainability?" In economics, profits and economic growth function as shared visions or measurements to be achieved by companies and countries. To this end, they create vision along with stories through production, marketing and advertisement via various means. It is up to the people whether or not they have shared vision along with a story for sustainability Shipley and Michela (2006). At this point, we are interested in comparing the two situations: (i) when societies have

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a vision with a story to achieve sustainability and (ii) when societies do not have such a vision, identifying the differences in the consequences.

In companies, core values and vision hold employees together and guide them toward the envisioned future. However, in public sectors, visioning is not utilized in a practical manner, and we believe that it should be able to play an essential role in bringing people together, especially for sustainability purposes. Such visioning is a major challenge because it needs to be inspirational, motivational and general enough to guide people on many occasions associated with choices and behaviors about sustainability. Furthermore, visioning needs to be agreed upon by the majority of stakeholders to reflect a common reference point for future planning. Narratives and stories are considered an engaging form of communication to spark inspiration in comparison to the traditional forms of educational materials such as articles, reports or policy debriefs (Sheppard, 2005, Robinson et al., 2011). Future planning, such as backcasting, scenario planning and FD, should be introduced to induce people to have some shared vision for sustainability with narratives and stories, which can be achieved through stakeholder exercises. In this paper, we suggest that "FD" may be of some use for this purpose, i.e., an idea of FD introduction to the existing future planning approaches. For the betterment of future planning, FD can be introduced and applied to municipalities, communities and the general public. We suggest some examples and ideas for incorporating FD into backcasting and scenario planning, further inducing people to be future-oriented and/or sustainable for strategy making. It is our hope that this research invites collaborative projects in future planning for sustainability.

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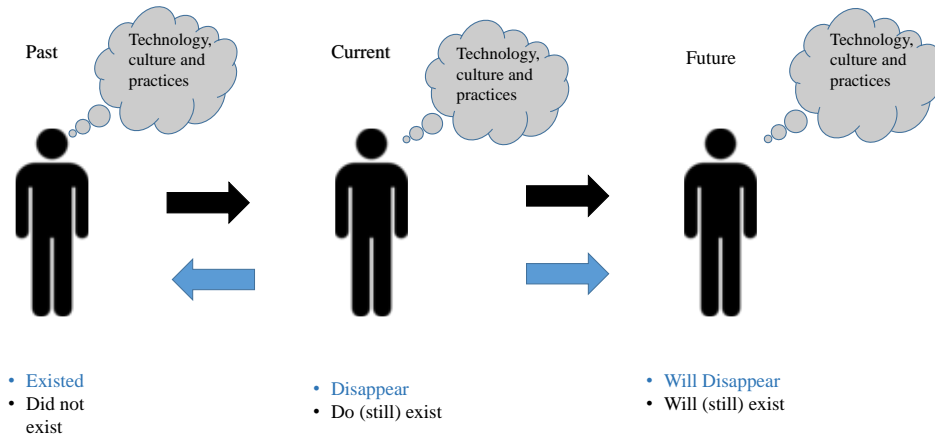
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Figure 1: Shared common visioning through a future design (FD) framework.
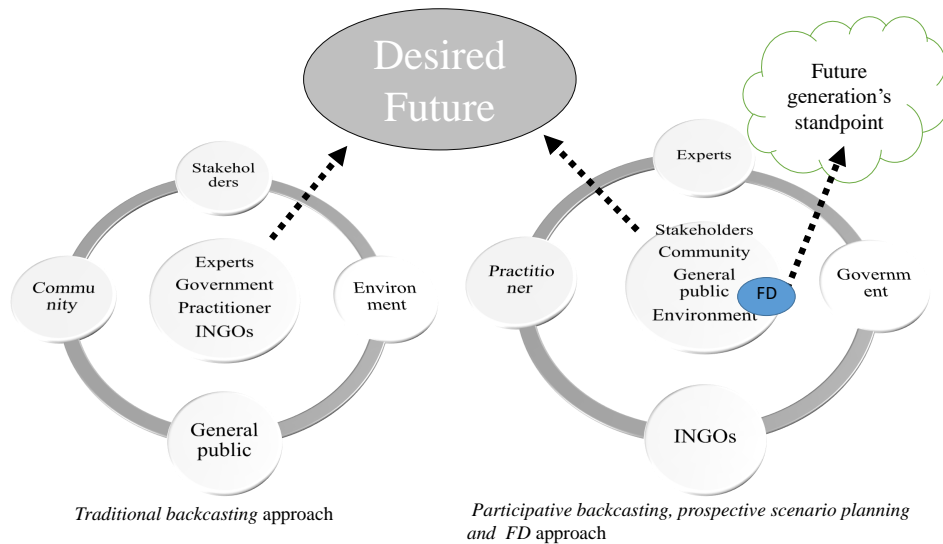

Figure 2: Visioning practices among backcasting, scenario planning and FD.

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Table 1: A general procedure for participative and interactive backcasting, prospective scenario planing and FD.

	Participative and Interactive Backcasting	Prospective Scenario Planning	FD
1. Initial visioning step	Identification of long-term sustainability criteria.	Determine the objectives and describe the purpose of analysis to decide on a number of scenarios.	Visioning from the perspective of the current generation.
2. Gap identification step	Analysis of the community's current state compared with the criteria defined in step 1.	Specify goals, constraints and targets along with exogenous variables, and bring drivers together into a viable framework.	Retrospective and prospective perspective taking and analysis of present situations.
3. Goal formation step	Development of what a successful system might look like in a sustainable society.	Undertake scenario analysis.	Send a request to the current generation from the perspectives of future generations, and next, update the vision assuming the request was accepted. Finally, strategies and decisions are made to realize the updated vision.
4. Strategy-pathway step	The construction and creative design of the pathways to the desired future's successful community.	Identify implementation requirements, and find the most critical outcomes to formulate a plan and conduct policy impact analysis.	Focus on enhancing the robustness of the vision.

We create the table for summarizing the concepts and procedures of backcasting, scenario planning and FD, which are consistent with the literature (Geurs and van Wee, 2004, Carlsson-Kanyama et al., 2008, Nakagawa, 2020).

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Table 2: The commonalities and differences between two approaches to visioning: (1) positive and (2) normative visioning.

	Processes	Outcomes	Validations
Positive visioning	Mostly practices in a top-down manner but sometimes in a bottom-up manner	A possible and plausible future that is mostly Utopian	It has low internal validity and high external validity
Normative visioning	Mostly practices in a bottom-up manner	Desirable future states	It has high internal validity and low external validity

A "top-down" approach of visioning is one in which experts, executives, governments or large intergovernmental organizations conduct visioning for society, whereas in a "bottom-up" approach, the general public, municipalities and communities work together to conduct visioning via their joint involvement. Other components of visioning are "internal validity," which is measured by its robustness, and "external validity," which is the extent to which the visioning can be generalized.