

Design for Social Innovation via the Lens of the Doughnut Model: Principles and Pathways Towards a Sustainable Future

Shuai Zhang¹, Jinwen Lv^{2,*}

¹*College of Design and Innovation, Tongji University, Shanghai, China*

²*Shanghai International College of Design & Innovation, Tongji University, Shanghai, China*

**Corresponding Author. Email: 2434072@tongji.edu.cn*

Abstract. With the aggravation of the crisis of social technology system, people pay more and more attention to the theoretical framework and practical path necessary for the transformation to sustainable development. This study combines the Doughnut model with the Design for Social Innovation (DfSI) approach to a thematic discussion of humanity's path to future sustainability. There is limited research on the design of interventions to achieve the Doughnut's socio-ecological goals. Doughnut's vision requires change driven by collective social action, and DfSI is inherently capable of guiding collective change toward new modes of production and lifestyles. We believe that DfSI can be used as a viable way for national and local sustainable transformation so that they can reach the safe and just operating space (SJOS). From the perspective of the Doughnut model, this paper introduces a new perspective for DfSI to study how to combine the core principles of the Doughnut model to enhance its implementation. Finally, this paper proposes a five-step conceptual framework for transforming Doughnut theory into local practice.

Keywords: the Doughnut model, Safe and just operating space, Design for social innovation, Social innovation, Design thinking, Sustainable development

1. Introduction

How can we realize higher and more equitably distributed levels of wellbeing within the environmental carrying capacity? Today's society and economy depend more than ever on a healthy ecosystem to function. The Doughnut model, as a new alternative economic framework, has the potential to change the prevailing practice of using GDP as the sole measure of economic and social development. In addition, to achieve a balance between human activities and the earth's self-healing mechanism, it is necessary to carry out profound social innovation to promote the transformation of lifestyles and production methods. This requires the use of social means to change our deep-rooted ideas and behavioral inertia. Design for social innovation (DfSI) (and/or social innovation) is increasingly considered as an option to address or mitigate social challenges and promote sustainable development.

There is no unified definition of social innovation. Take the European Commission, it defines social innovation as innovation, and the goals and methods are essentially the same sociality. These innovations include new concepts, products, services and business models that meet the needs of society, and they also promote new social relationships or partnerships [1]. According to Rogge et al., social innovation can be understood as ideas, goals, and/or activities (or a combination thereof) that aim to change social relationships, involving new behaviors, ways of thinking, and/or organizational energy [2]. Social innovation introduces innovative ideas, strategies or projects that are more effective than existing solutions to address the challenges in socio-technical systems. In terms of resource reallocation and cross-sectoral collaboration, these initiatives promote social inclusion and empowerment, as well as institutional or behavioral change [3, 4].

Although the boundary between DfSI and social innovation is vague, this study uses the expression 'Design for social innovation', which emphasizes the important role of design thinking in catalyzing social change and guiding individuals to a better life. Before conducting follow-up research, it is necessary to clearly define this concept. By splitting 'Design for Social Innovation' into 'social innovation' (the outcome) and 'design' (the methodology), the purpose is revealed: to catalyze social innovation and system change through design. Therefore, compared with social innovation, DfSI focuses more on the process of achieving profound social transformation and establishing sustainable system mechanisms. DfSI also has the fundamental characteristics of social innovation, the difference is that social innovation is a design-driven process here. As widely recognized, it emphasizes the use of design tools, thinking, and processes to creatively solve complex social problems or enhance existing solutions. DfSI includes designing any action that can be taken to initiate, advance, support, strengthen, and replicate social innovation [5]. From this perspective, it is one of the ways to achieve social innovation. Social innovation can be achieved through various ways by social activists, policy makers or enterprises, and DfSI refers specifically to the adoption of design thinking and methods.

In terms of systematic thinking, co-creation, stakeholder collaboration, prototyping, and visualization, design is indeed a powerful methodology in social innovation, and the democratic nature of design thinking can also promote sustainable change [6]. It is worth noting that most studies discuss the relationship between DfSI and sustainability mainly from a social perspective. At present, the theories and methodologies of social innovation to deal with social challenges are relatively mature and perfect. Many studies have shown that social innovation can effectively improve the quality of social structure and create systematic changes to cope with a series of harsh and persistent social challenges through participatory, inclusive and sustainable methods [7-9]. Among the few papers on environmental issues, some focus on the macro level, examining the links between social innovation and pressing global challenges [10], and recognizing the potential of social innovation in strengthening the management of complex social ecosystems and achieving profound transformation [11, 12]. Another type of research is from the micro level, that social innovation can solve specific planetary boundary issues, such as the energy and climate crisis [2], biodiversity loss [13]. The separation of social and ecological considerations is at the core of the problem that drives the unsustainability of the Anthropocene [10]. Therefore, the overall framework of DfSI must be based on a more comprehensive set of indicators.

The Doughnut theory holds that the economy should not aim for endless growth. What it really wants to do is to preserve the collective welfare of mankind within ecological boundaries. The core of this theory is the Doughnut model, which, in Figure 1, brings together the Sustainable Development Goals (SDGs) and planetary boundaries. It argues that economic activity must take place in an area known as the 'safe and just space for humanity', which is conceptualized as a

doughnut-shaped area sandwiched between social and planetary boundaries. The significance of this framework is that it provides a new set of values for humanity and the planet, as well as a new set of methods to guide action [14].

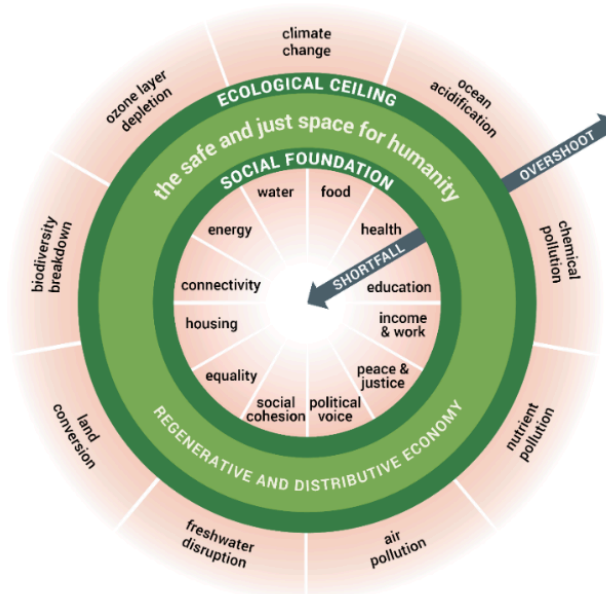


Figure 1. Classic Doughnut (Raworth 2012)

From the relevant literature, the application of the Doughnut model is generally divided into two categories: one is interdisciplinary practice, and the other is to use it as a sustainable assessment method and analytical framework. The interdisciplinary application of Doughnut model mainly focuses on urban planning [15, 16] and business [17, 18]. There are few studies in the fields of national policy formulation [19], tourism [20], jurisprudence [21] and culture [22]. In addition, as a methodological and analytical framework for sustainability assessment, the Doughnut model has been used to quantify the country's place in the Safe and Just Space (SJS) [23] and to assess whether urban development exhibits ecological overshooting or social injustice [24, 25]. It also provides economic guidance for the formulation of policies and corporate strategies, and promotes the development of social goals, environmental goals, and economic goals in a more harmonious way [26]. In general, in the literature related to the Doughnut model, there are still few studies that treat design intervention as a way to achieve the goal of 'safe and just operating space for humanity'.

The theory and practice of the Doughnut model and DfSI have triggered extensive discussions in different fields, but it is still lacking to truly integrate the two and make a deep integration. On the one hand, in the field of Doughnut research, few studies have explored the use of design interventions to achieve the goal of entering the safe and just operating space, and achieving the Doughnut goal still faces some substantive challenges. Although studies have shown that promoting large-scale transformation through the Doughnut model relies on effective local governance [27], research and practice on narrowing the Doughnut model to meet local sustainability challenges are still insufficient. In addition, there are some persistent problems, such as the lack of participatory governance in terms of governance and implementation, and the conflict between the core principles of the Doughnut model and the popular development paradigm. Designing interventions can enhance the operability of the Doughnut model. We can accumulate practical experience in local governance, promote the transformation of participatory governance models, and reshape collective

values and production and lifestyles. At present, most of the research on DfSI regards it as a catalyst to improve social services and stimulate economic growth. When it can be truly implemented, the blueprint and operational guidelines for sustainable transformation are still lacking. What this study wants to make clear is that it is not feasible to integrate DfSI with the Doughnut economic framework. We first make a comprehensive definition of DfSI and make a theoretical supplement based on the Doughnut model. On this basis, we propose an operable framework, hoping that it can guide the transition to sustainable development more effectively. The research mainly focuses on three key questions:

RQ1: What are the theoretical intersections between DfSI and the Doughnut model?

RQ2: What new perspectives can the Doughnut model offer to supplement and enrich the existing theoretical framework of DfSI?

RQ3: How can DfSI serve as an effective pathway to achieving the Doughnut's goals?

2. The connection between the Doughnut model and DfSI

Due to its inherent sociality and local adaptive goals and methods, DfSI has contributed to social wellbeing within the Doughnut model's social boundary, but existing research has generally failed to find an effective way to balance the production and life of the planetary boundaries. In addition, the Doughnut model is still largely confined to theoretical discussions and case studies. The path of cross-domain seeking to enter the 'safe and just operating space' is still in the exploratory stage, and its guiding role in global development and regional development needs to be further enhanced. Therefore, we try to compare the Doughnut model with DfSI for two purposes: first, to find the intersection and potential complementarity between them; second, try to integrate the two and develop a new framework of sustainable orientation with both theoretical rationality and practical feasibility. The basic concepts of the two are related to each other in several aspects, as shown in Figure 2.

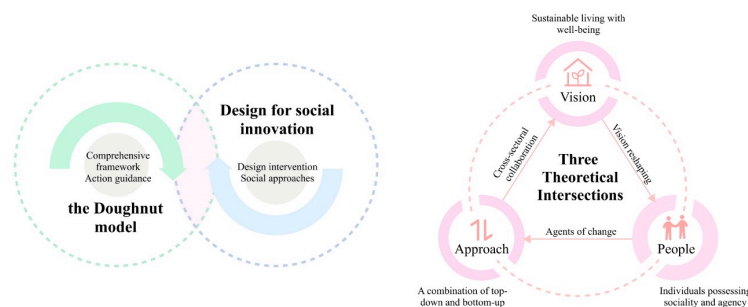


Figure 2. The relation between the Doughnut model and DfSI

2.1. Theoretical intersection

2.1.1. Vision: sustainable living with wellbeing

In DfSI, social needs can be effectively met by mobilizing the capacity of social actors, improving the social structure, and promoting low-carbon production and lifestyles [28]. Reducing resource consumption and improving resource utilization can both contribute to reducing the adverse impact of human activities on the environment. In Manzini's view, a sustainable social vision needs to be both localized and inclusive, drawing strength from creative communities, collaborative networks, and Cosmopolitan Localism [29]. Creative communities rely on the common interests. It devotes

itself to the new economic model with de-growth as the core, and replaces the product-intensive development model with this model [30]. The mainstream consumption model is subverted by it, and the resource consumption is reduced. The metropolitan side brings together diverse activities and participants so that existing resources can be fully utilized, and resource efficiency is strengthened in this sense. DfSI's vision is consistent with the Doughnut model's goal of achieving social wellbeing within ecological limits.

In addition, both seek a spiritually fulfilling and dignified lifestyle. In collaborative networks, communities and localities function as nodes in highly interconnected systems, enabling individuals to achieve happiness beyond material satisfaction and to build high-quality social connections. The Doughnut model aims to shift economic development from a single focus on material gains to a more comprehensive socio-ecological approach. The future prosperity of people and communities goes far beyond the satisfaction of basic necessities and includes a life of creativity and satisfaction [31]. Although there is currently no evidence that DfSI can fully guide us into a safe and just operating space, it can at least to some extent drive us towards an interconnected, high-quality lifestyle.

2.1.2. Approach: a combination of top-down and bottom-up

When looking for the path of change, DfSI usually combines bottom-up and top-down methods, and which one to choose depends on the starting point of change and who the initial advocate is [5]. From a macro perspective, DfSI needs not only grassroots organizations of citizens and communities, but also experts, policymakers and multi-sectoral stakeholders to promote two-way collaboration. In this way, an environment conducive to cooperation is created between sponsors and participants in creative communities, and the necessary policy support and infrastructure are available [32]. The larger the scale of transformation, the more necessary it is to strengthen the interaction between top-down and bottom-up [5].

The application of the Doughnut model also uses these two methods, and the mainstream approach is biased towards top-down. However, the transition to sustainable development can not only rely on a top-down path [28], so that it is easy to miss the value of localization solutions and community participation. Therefore, the hybrid structure becomes necessary [33]. This study argues that DfSI can promote the combination of the Doughnut model and local sustainable governance, which is described in Chapter 4.

2.1.3. Understanding of people: possessing sociality and agency

DfSI attaches great importance to the key role of human initiative in the process of social transformation. Each service recipient is likely to become a capable designer in a better life [6]. What DfSI wants to do is not only to solve the problem, but also to enable people to live according to their own wishes. For those individuals with initiative, a fulfilling life includes a sense of belonging, a sense of security and a sense of respect at the individual level and the social level. They will constantly adjust their values to respond to changes in the environment and society, and take the initiative to find solutions.

Similar to DfSI, within the theoretical framework of the Doughnut model, people's behavior is inherently complex, social and dynamic. Adaptive social actors hold dynamic values and tend to pursue the satisfaction of multidimensional psychological, cultural and social needs. They embed themselves in social networks and value reciprocal, interdependent cooperative relationships and collective responsibility.

2.2. Potential complementarity

2.2.1. Objectives: establishing a collective vision

DfSI's goals can be broadly divided into two categories: the primary goal is to achieve social goals and promote social development [34, 35], and the ultimate goal is to promote social change at the collective or group level [36]. While the goals of the DfSI are consistent with the new development paradigm advocated by the Doughnut model, some emerging lifestyles may not be guaranteed to move in the right direction during a sustainable transition. In other words, we need a shared vision of sustainability. The Doughnut model just provides a concise and powerful visual framework to visually present the relationship between human society and nature. This contributes to a clearer understanding of this thriving vision, which in turn motivates local communities to overcome sustainability challenges. Turner et al. argue that this can be achieved by reducing the size of the doughnuts and leading local authorities to effective sustainable governance [27]. The Doughnut toolkits, developed by Doughnut Economics Action Lab (DEAL), can help community residents, third-party organizations, policy makers and experts to assess whether innovative solutions promote ecological and social prosperity. In this way, the necessary conditions to meet the sustainability of shared goals are guaranteed to a certain extent.

2.2.2. Environmental issues: toward an integrated approach

From the perspective of sustainability, the human-centered DfSI concept has recognized the necessity of sustainable transformation, but it often puts social benefits ahead of the common prosperity of humans and ecosystems. This concept may also inadvertently contribute to anthropocentrism, putting human interests above the long-term prosperity of the earth. Its original intention is to satisfy people's desire to improve their way of life, and environmental protection has only become a secondary result. Haskell et al. suggested that future social innovation requires environmental conditions as a prerequisite for social development [12], which is highly consistent with the embedded economy advocated by the Doughnut theory. At this point, the Doughnut model can be a theoretical supplement to DfSI, emphasizing that such design should be guided by strong sustainability. Humanity is moving beyond planetary boundaries at an almost unstoppable rate and with a rapidly expanding range, and social innovation must fundamentally improve the relationship between humans and the Earth. It is not enough to simply reduce the impact on the environment [10]. This requires addressing local environmental problems and systemic impacts at a macro level from a broader socio-ecological perspective [12]. The Doughnut model integrates planetary boundaries and societal boundaries, which may provide a systematic perspective for social innovation practice.

3. Reconceptualizing DfSI through the lens of the Doughnut model

In response to the third question, we try to put forward a new perspective on the concept of DfSI from the perspective of the Doughnut model, hoping to better guide local practice. Next, we will discuss initiatives for DfSI grounded in the Doughnut model. These strategies deal with the main challenges it encounters in actual implementation, and also find potential new paths to enter the safe and just operating space.

3.1. Design thinking in DfSI promotes sustainable development

Design thinking plays an important role in the process of social innovation. It is understood as both a problem-solving approach and a common set of problem-solving processes [37]. Design thinking can use empathy to help DfSI reveal the real needs of users and work as a team to iteratively develop solutions—from concept generation, prototype design to testing. Social innovation is characterized by complexity and dependence on community participation, which is consistent with the attention of design thinking to human initiative and its interdisciplinary collaboration. The inherent empathy, adaptability and inclusiveness of design thinking make it one of the mechanisms for cultivating social innovation [38]. As a methodology of creative problem solving, design thinking is the core driving force to promote social innovation, which can effectively meet the needs of society and promote the transformation of society to the required direction. First, it gives social innovation the ability to use collective wisdom to mobilize existing resources, create new knowledge, and reshape social relations; second, the design thinking has changed from design for 'people' to design with 'people' [8], so that more non-professionals become active participants, designers and builders in the process of problem solving; third, it enables the creation of customized solutions for localities or communities in a more nuanced way. However, it is worth emphasizing that from the standpoint of the doughnut, this paper argues that the inherent anthropocentrism in design thinking should be avoided. Adopting this approach does not mean that human needs should take precedence over nature. On the contrary, its fundamental purpose is to mobilize social resources and collective power to protect our ecological environment as a means for DfSI to promote the sustainable transformation of social technology systems, so as to achieve a truly sustainable and fulfilling life.

3.2. Redefining the concept of DfSI

Based on the previous discussion of the potential complementarity between DfSI and the Doughnut model, we try to integrate the core principles of the Doughnut model into the definition of DfSI. Although DfSI covers a wide range, not all designs meet the requirements of DfSI. Summing up Manzini's view in *Design, When Everybody Designs*, he identified two basic conditions for DfSI: first, it must aim at social change; second, the driving force for change must come from society, not technology. To govern society as a force for change requires collaborative design or participatory processes. DfSI is the practice of professional designers to integrate creativity and design culture into the collaborative design process. In this process, they regard society as a force for change, and finally cultivate new sustainable social structures and economic models.

In DfSI, design creativity and collaborative design play a crucial role in addressing social challenges. At present, there is still a lack of systematic empirical evidence, and it is difficult to confirm whether this process can continue to move in the direction of sustainable development. We also lack a comprehensive guiding framework to determine whether the social changes resulting from the DfSI process are truly consistent with sustainable development [39]. It is necessary to use the Doughnut model to re-examine and extend the concept of DfSI, which will allow DfSI to run within the Doughnut framework, thus helping humans move towards the safe and just space for humanity.

We feel that, to put it bluntly, DfSI based on the Doughnut model can be seen as a design process intended to enable SI to help people get a safe and just living space. To make the definition more detailed, that is: DfSI from the perspective of Doughnut involves a series of (social innovation) activities. These activities use design thinking and methods to put the ability to independently solve

social problems and ecological crises into the hands of individuals, thus helping to reshape the relationship between humanity and the ecosystem, and ultimately to a benign balance.

The ability to solve problems independently and create a better life is itself a manifestation of personal value. DfSI takes advantage of the enthusiasm of individuals to strive for a better future, and also unlocks the foundation of each person's inner ability: collaborative action, thus promoting changes at the social level. Collaboration means bringing all capable individuals together to create new values and lifestyles. These new concepts and actions are tested, iterated, replicated and expanded through small-scale local experiments and collaborative networks, forming broader action networks that catalyze large-scale change. At the same time, this concept emphasizes that the results of DfSI solve the various dimensions of sustainable development as a whole. Not only do they achieve social fairness and justice and enhance society's ability to withstand uncertain crises, but they also avoid negative environmental impacts—indeed, they nurture ecosystems.

4. DfSI serves as a means to achieve the Doughnut goals

Based on the above analysis, we believe that DfSI provides a feasible way to achieve the Doughnut goals. The DfSI action within the Doughnut framework sees the harmonious coexistence of humans and nature as a collective vision that creatively encourages, supports and engages the public in building sustainable solutions to complex problems. This process highlights the great potential of design thinking and its methodology. The goal is to put the social dimension and the ecological dimension together and balance the relationship between human development and the ability of the earth to recover.

In order to develop DfSI strategies based on the Doughnut model and ensure the sustainability of its results and impacts, the core principles of the Doughnut must be applied throughout the entire implementation process of DfSI. In addition, DfSI will integrate the 'Doughnut Unrolled' tool, which was developed to put the Doughnut framework into practice at the local level, as shown in Figure 3 [40]. On the basis of this existing framework, design thinking is used to enhance its public participation, local adaptability and dynamic adjustment ability, so as to fully realize its potential as a transformation tool. Design thinking plays an important role as a theoretical basis in DfSI, providing a provable and operable working framework and innovation process for these works. Therefore, we propose five action frameworks that integrate design thinking with 'Doughnut Unrolled' as a supplement and refinement to the existing DfSI strategy. The 'Doughnut Unrolled' methodology is based on DEAL 'Data Portrait of Place' handbook, and Figure 4 shows this action framework.

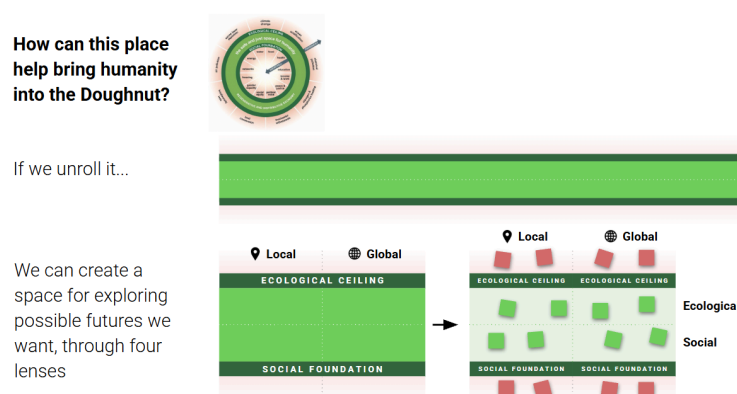


Figure 3. Unrolling the Doughnut (DEAL 2022)

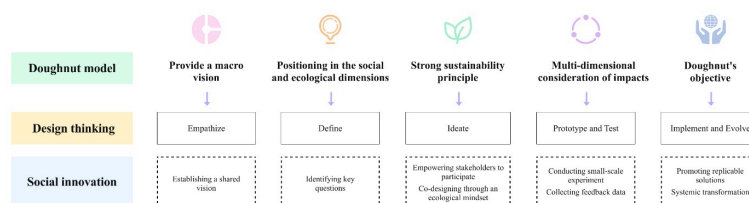


Figure 4. Action framework based on the Doughnut model

4.1. Developing a sustainable vision grounded in social consensus

The Doughnut model, as a normative framework, gives a long-term macro perspective. As for the best means to achieve the goal, it does not specify [41]. In this framework, the transformative DfSI leverages empathy to mobilize society in support of sustainability initiatives and to coordinate different groups to shape a better future. Empathy mechanisms are easy to selectively focus on those identifiable elements in the immediate environment, which makes it difficult to effectively respond to complex social and ecological challenges [42]. It is particularly necessary to transform grand and distant ecological problems into tangible and personal experiences. As a visualization tool, 'Doughnut Unrolled' allows residents to identify and reflect on existing social and environmental problems. By using different interactive methods, DfSI guides participants to simulate or imagine their position in the ecosystem. These experiences can provoke strong emotional resonance [43].

At this stage, empathy plays a very important role. It organizes social relations and allows emotional connections between participants. The collaborative network is thus constructed, and the foundation of a common vision is thus laid. This common vision shows the potential of sustainable life. The traditional top-down master plan is different from it. It relies on extensive participation and collaboration to provide a dynamic and adaptive blueprint for the future. Under the guidance of the Doughnut model, DfSI has to evaluate whether the target helps to maintain the ecological boundaries and whether it helps to strengthen the resilience of the social system to solve the uncertainty and complexity of the background.

4.2. Identifying key issues using both Doughnut and DfSI methods

Designers often put themselves into communities, groups and specific environments, live with stakeholders, engage in dialogue, observe behavior, and analyze potential pain points. They take all participants to refine and define a challenge that everyone agrees on, and then reframe these questions to expose new possibilities. In the second stage, designers can use the 'Doughnut Unrolled', which is a local-level thinking, decision-making and action tool. It helps to see a place's vision at the social and ecological levels, and whether it can be matched with respect for human rights and the realization of planetary health. With this tool, we can also discuss the possible transformation pathways further. 'Doughnut Unrolled' suggests selecting indicators from four key dimensions, namely, local ecological, local social, global ecological and global social. The evaluation process of these indicators focuses on data collection, relying on quantitative analysis to find out the local situation, set goals, and find out the gaps and challenges between them.

At this stage, we believe that integrating qualitative methods into DfSI—in terms of in-depth interviews, focus groups, participatory observations, contextual interviews, and co-creation workshops—can enhance the inclusiveness of Doughnut goal setting. These qualitative methods not only supplement the necessary data, but more importantly reveal the potential cultural consensus

and potential social conflicts that form these data. Currently, the Doughnut focuses more on quantitative analysis. From the perspective of 'Social-Ecological', field data collection is carried out in the local reference habitat to determine the ecological performance gap between the local area and the reference site, so as to establish locally customized ecological objectives. Even if we construct a 'local portrait' and want to fundamentally define this phenomenon and propose creative strategies, limitations still exist; simply to quantify the local contour, the complexity of the real-world situation is not captured [41]. The official data collection and detection capabilities are relatively limited, and these profiles often fail to fully reflect the interests of all residents. This limitation may lead to missing data or make it difficult to identify key issues; take the marginal groups and vulnerable groups, the overall wellbeing of the community is reduced.

With the help of ethnographic methods, DfSI can interact with community life more flexibly, and reveal the implicit rules, social forms and practices that are often taken for granted and rarely elucidated. Semi-structured or open interviews with specific groups can help us identify the social conflicts they encounter, as well as the emotions and opinions brought about by these conflicts; this kind of method can dig deep and find out the potential motives and values that affect individual behavior, and the potential contradictions within the social structure and social system are also reflected.

4.3. Conceptualizing solutions for entering the safe and just operating space

4.3.1. Inspire citizens' initiative

For the new economic model aimed at repairing the social structure and ecological structure, it is very important to support the initiative of citizens and communities. The life skills and innate abilities of some non-professionals constitute a 'diffuse design skill' [44]. Therefore, the active participation of amateurs, as well as their diverse collaboration with experts, has gradually become an indispensable part of the design process. DfSI is good at using various methods to encourage participants to use their own wisdom and potential design talents to carry out cooperative innovation. In the case of participatory design methods based on democratic innovation, each participant is regarded as a problem-solving expert. Through workshops, seminars and similar forms, a fair and open communication environment can be created, allowing participants to express their ideas freely and confidently.

For DfSI, Empowerment theory is a key principle in collaborative efforts, emphasizing personal competence, a sense of control, and the enhancement of self-worth [45]. It aims to stimulate the intrinsic motivation of individuals to participate in decision-making and action [46]. In the case of urban community projects, giving participants decision-making power can motivate them to contribute ideas and suggestions. Or, provide individuals in extremely poor areas with training in knowledge, financial management, and life skills to enable them to establish local mutual aid networks. These networks promote the sharing of experience, the provision of loan guarantees, and the resolution of collective problems. In addition, the creation of low-threshold platforms or competition through open-source operating systems and open innovation can invite a wider range of citizens, non-profit organizations, and businesses to provide advice.

4.3.2. Adhere to the strong sustainability principle in collaborative design

Some scholars have suggested that the top-down and bottom-up combination of participatory governance, the most important thing is to adhere to the strong sustainability principle of the

Doughnut model [41]. Following the principle of strong sustainability means that citizen-led innovation programs should change from people-centered to ecological environment-centered. Incorporating the consideration of the ecological environment into the action approach of DfSI requires designers to guide and encourage participants to participate in discussion, negotiation and formulation of programs with an ecological mindset.

4.4. Depicting dynamic local Doughnut portraits

In this stage, the Doughnut tool is used to help explore the significance of the strategies proposed by DfSI to the local communities and ecosystems, and also to examine the impact of these strategies on the wellbeing of all human beings and the health of the earth. DfSI is oriented to complex socio-technical problems. Any solution may produce unpredictable results when it comes to real behaviour, culture and system. It is necessary for us to further collect real feedback data through prototype testing. The fast iterative scheme based on feedback is a cyclic process. At present, the application of 'Doughnut Unrolled' may only reflect the current static situation, and it is not enough to dynamically and iteratively track and adjust according to environmental changes. The advantage of combining the DfSI method with it is that the DfSI driven by design thinking makes the static Doughnut portraits more flexible, enriches it with new data, and gives it constant change to adapt to different times and different fields.

4.5. Facilitating the large-scale implementation of the Doughnut model

The goal of this phase is to connect successful local experiments based on the Doughnut model and enable them to scale up, thereby amplifying the impact of cluster social change and promoting large-scale sociocultural, institutional and organizational transformation.

After extending the Doughnut model to the local, successful examples of iterative local updates can be used as operational references for other regions, whether these regions are nearby or on a global scale. Take the development collaboration platform, you can regularly share case studies, experience and open-source toolkits, or establish an online community. These replicable solutions should undergo pilot testing or prototype verification, and have reliable data support to show positive social and ecological impacts. They should be refined into clear, repeatable operational workflows or core components, which means that the key success factors can be identified and taught.

DfSI not only focuses on solving specific problems in a specific dimension of the Doughnut, but also aims to generate new knowledge and possibilities through this process and spread them out. On the one hand, it enriches the practical experience of the Doughnut model; on the other hand, it expands the application scope of the Doughnut model. For DfSI, problem solving is more like an open exploration and learning journey in which design, development, experimentation, and implementation take place simultaneously, interacting and iterating with each other [47]. The DfSI-driven transformation is essentially a purposeful experiment to re-establish our relationship with society and nature [29]. Therefore, the data and experience accumulated from successful experiments are of great value for large-scale systematic changes aimed at achieving the Doughnut goals.

5. Discussion

Our research combines the theoretical guidance of the Doughnut model with the practical application advantages of DfSI. It proposes a strategic framework that starts with small-scale pilot projects and moves towards sustainable transformation in the wider region. Sustainable development, in fact, is to find a balance between environmental problems and social problems. By integrating the core principles of the Doughnut model into DfSI, this approach is positioned as a promising way to redesign human behavior and reverse the crisis between humans and the planet. DfSI effectively bridged some of the gaps between the current state and the expected state in the Doughnut model and played a unique role in promoting sustainable development.

The Doughnut model gives global goals at the macro level, but there are various differences and constraints in terms of resources, economy and life experience at different geographical scales [48]. How to reconcile global correlation and local applicability, the specific method is still unclear [49]. DfSI can help identify local specific interests and challenges, making solutions based on Doughnut standards more localized and diverse. In addition, it also relies on distributed collaborative networks to cultivate collective wisdom and action to solve systemic problems.

The Doughnut model is extended from the global level to the local level, usually taking a top-down governance path, which is not flexible and socially legitimate; a new way of thinking, so that more stakeholders to participate in the dialogue, the goal of action can be more effectively identified down, which requires a new form of participatory governance. Turner et al. argue that 'creativity' that unleashes the potential of civic institutions and the third sector promotes multi-stakeholder networks, and that the impact of sustainable development initiatives is magnified [27]. The goal of the Doughnut model includes several interrelated subsystems. The government-led model lacks the ability to transform interdisciplinary and cross-sectoral systems, and requires an interdisciplinary approach to negotiate and integrate the visions of participants [50]. Combining the Doughnut model with DfSI, its advantage is that it can form a cross-scale network, linking global knowledge with local knowledge, and cross-border resolution of complex challenges is promoted.

There is a fundamental conflict between Doughnut's principles and the inherent policy framework, especially in terms of development indicators [41], which undoubtedly adds conceptual challenges to its local implementation. For the sake of social wellbeing and citizen wellbeing, the Doughnut model should use DfSI to counter the misleading creed of consumerism. In doing so, it is encouraging the redesign of the economic model to cultivate people's ability to take care of each other, and society will be more resilient and cohesive.

6. Conclusions

The main contribution of this study is to establish the connection and correspondence analysis between the core principles of the Doughnut model and the DfSI methodology for the first time. At present, the unprecedented challenges in the social technology system force more and more people to think about what kind of theoretical guidance and practical methods are needed to transform to the sustainable development model. The new development paradigm requires transformative interdisciplinary research and large-scale social collective action. As an alternative economic framework at the macro level, the Doughnut model encourages interdisciplinary integration and collaboration so that programs to address the social and ecological challenges of the twenty-first century are better developed; DfSI also seeks to guide individuals to a more sustainable and fulfilling lifestyle, which may bring about collective changes in human life and production practices.

This study synthesizes and sorts out the main viewpoints of the Doughnut model and DfSI research, and systematically examines the potential relationship between the two and the possibility of conceptual integration from multiple dimensions. We believe that the two have something in common in the three dimensions of 'Vision', 'Approach' and 'Understanding of people'. The Doughnut model complements and enriches the existing DfSI theoretical framework at the target level and the method level. These findings provide a theoretical basis for proposing an action framework for sustainable development.

In addition, in order to solve the problem of blurred boundaries between DfSI and Social innovation, this study proposes a clear conceptual definition of these two terms, and further provides a new definition and conceptual framework for DfSI from the perspective of the Doughnut.

We believe that DfSI, based on the core principles of the Doughnut model, is an effective way to achieve sustainable transformation of socio-technical systems, while also developing a flexible and locally adaptive framework for action. The innovative, systematic and interdisciplinary nature of DfSI and its potential to catalyze collective transformation provide it with a good internal positioning for addressing complex social challenges and ecological crises. It is a powerful way to balance social boundaries and ecological boundaries, so communities can enter the 'safe and just operating space'. How does DfSI enhance the operational feasibility of the Doughnut model? This study shows that DfSI can apply the Doughnut model to the socio-technical transformation at the local level through participatory, systematic and dynamic iteration.

According to Doughnut theory, sustainable development requires multi-dimensional system balance. Therefore, this paper emphasizes the key role of design thinking and a strong sustainability mindset in promoting DfSI to achieve Doughnut goals, and attempts to propose a new practical framework. The five guiding phrases proposed in this paper add a novel perspective on how Doughnut theory paves the way for a sustainable future.

Author contribution

Conceptualization, S.Z. and J.L.; methodology, J.L.; software, J.L.; validation, S.Z., J.L.; formal analysis, S.Z.; investigation, J.L.; resources, S.Z.; data curation, J.L.; writing—original draft preparation, S.Z. and J.L.; writing—review and editing, S.Z. and J.L.; visualization, J.L.; supervision, S.Z.; project administration, S.Z.; funding acquisition, S.Z. All authors have read and agreed to the published version of the manuscript.

Funding information

This work was sponsored by National Natural Science Foundation of China (72104185), the Fundamental Research Funds for the Central Universities (22120250436) and Tongji University Xinrui Young Talents Grant for Social Sciences and Humanities (2025XR10).

Institutional review board statement

Not applicable.

Informed consent statement

Not applicable.

Data availability statement

No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Acknowledgment

All the authors have reviewed and edited the output and take full responsibility for the content of this publication. We thank to the National Natural Science Foundation of China for its sponsorship.

Declaration of interest

The authors declare no conflicts of interest.

References

- [1] Bureau of European Policy Advisors (BEPA). (2010). Empowering people, driving change: Social innovation in the European Union. Bureau of European Policy Advisors. <https://op.europa.eu/en/publication-detail/-/publication/4e23d6b8-5c0c-4d38-bd9d-3a202e6f1e81/language-en>
- [2] Rogge, K. S., Stadler, M., de Geus, T., Hielscher, S., Wittmayer, J., Broich, A., Kotler, A., Mischkowski, N., Stasik, A., Ranville, A., & Vernay, A.-L. (2023). Fit for social innovation? Policy reflections for EU energy and climate policy making. *Oxford Open Energy*, 2, oia010. <https://doi.org/10.1093/ooenergy/oia010>
- [3] Solis-Navarrete, J. A., Bucio-Mendoza, S., & Paneque-Gálvez, J. (2021). What is not social innovation. *Technological Forecasting and Social Change*, 173, 121190. <https://doi.org/10.1016/j.techfore.2021.121190>
- [4] Gibovic, D., & Bikfalvi, A. (2025). Informing scalability for social innovation: Evidence from a recycling initiative. *Waste Management & Research*, 43(11), 1827–1837. <https://doi.org/10.1177/0734242X251315678>
- [5] Manzini, E. (2014). Making things happen: Social innovation and design. *Design Issues*, 30(1), 57–66. https://doi.org/10.1162/DESI_a_00257
- [6] Chick, A. (2012). Design for social innovation: Emerging principles and approaches. *Iridescent*, 2(1), 78–90. <https://doi.org/10.1080/19235003.2012.11428507>
- [7] Hillgren, P.-A., Seravalli, A., & Emilson, A. (2011). Prototyping and infrastructuring in design for social innovation. *CoDesign*, 7(3–4), 169–183. <https://doi.org/10.1080/15710882.2011.630474>
- [8] Golestaneh, H., & Sadeghi Naeini, H. (2024). The transformative role of design for social innovation in community development at the local level. *Quarterly Journals of Urban and Regional Development Planning*, 9(31), 31–67. <https://doi.org/10.22034/urdp.2024.407979.1572>
- [9] Wittmayer, J. M., Hielscher, S., Rogge, K. S., & Weber, K. M. (2024). Advancing the understanding of social innovation in sustainability transitions: Exploring processes, politics, and policies for accelerating transitions. *Environmental Innovation and Societal Transitions*, 50, 100805. <https://doi.org/10.1016/j.eist.2024.100805>
- [10] Olsson, P., Moore, M.-L., Westley, F. R., & McCarthy, D. D. P. (2017). The concept of the Anthropocene as a game-changer: A new context for social innovation and transformations to sustainability. *Ecology and Society*, 22(2), 31. <https://doi.org/10.5751/ES-09310-220231>
- [11] Biggs, R., Westley, F. R., & Carpenter, S. R. (2010). Navigating the back loop: Fostering social innovation and transformation in ecosystem management. *Ecology and Society*, 15(2), 9. <https://doi.org/10.5751/ES-03411-150209>
- [12] Haskell, L., Bonnedahl, K. J., & Stål, H. I. (2021). Social innovation related to ecological crises: A systematic literature review and a research agenda for strong sustainability. *Journal of Cleaner Production*, 325, 129316. <https://doi.org/10.1016/j.jclepro.2021.129316>
- [13] Ziegler, R., Balzac-Arroyo, J., Hölsgens, R., Holzgreve, S., Lyon, F., Spangenberg, J. H., & Thapa, P. P. (2022). Social innovation for biodiversity: A literature review and research challenges. *Ecological Economics*, 193, 107336. <https://doi.org/10.1016/j.ecolecon.2021.107336>
- [14] Raworth, K. (2017). A doughnut for the Anthropocene: Humanity's compass in the 21st century. *The Lancet Planetary Health*, 1(2), e48–e49. [https://doi.org/10.1016/S2542-5196\(17\)30028-1](https://doi.org/10.1016/S2542-5196(17)30028-1)
- [15] Hjelmkog, A., Toney, J., Scott, M., Crawford, J., & Meier, P. (2023). Using the doughnut economics framework to structure whole-system thinking in socioecological wellbeing with multidisciplinary stakeholders: An applied case study in Glasgow, Scotland. *The Lancet*, 402, S15. [https://doi.org/10.1016/S0140-6736\(23\)02088-9](https://doi.org/10.1016/S0140-6736(23)02088-9)

- [16] Khmara, Y., & Kronenberg, J. (2023). On the road to urban degrowth economics? Learning from the experience of C40 cities, doughnut cities, transition towns, and shrinking cities. *Cities*, 136, 104259. <https://doi.org/10.1016/j.cities.2023.104259>
- [17] Sahan, E., Sanz Ruiz, C., Raworth, K., van Winden, W., & van den Buuse, D. (2022). What doughnut economics means for business: Creating enterprises that are regenerative and distributive by design. *Doughnut Economics Action Lab*. <https://research.hva.nl/en/publications/what-doughnut-economics-means-for-business-creating-enterprises-t/>
- [18] Hausdorf, M., & Timm, J.-M. (2023). Business research for sustainable development: How does sustainable business model research reflect doughnut economics? *Business Strategy and the Environment*, 32(6), 3398–3416. <https://doi.org/10.1002/bse.3387>
- [19] Warnecke, T. (2023). Operationalizing the doughnut economy: An institutional perspective. *Journal of Economic Issues*, 57(2), 643–653. <https://doi.org/10.1080/00213624.2023.2202593>
- [20] Hartman, S., & Heslinga, J. H. (2023). The doughnut destination: Applying Kate Raworth's doughnut economy perspective to rethink tourism destination management. *Journal of Tourism Futures*, 9(2), 279–284. <https://doi.org/10.1108/JTF-10-2022-0257>
- [21] Buser, A. (2024). From doughnut economics to doughnut jurisprudence: A human rights perspective. *Human Rights Law Review*, 24(2), ngae002. <https://doi.org/10.1093/hrlr/ngae002>
- [22] Urai, A. E., & Kelly, C. (2023). Point of view: Rethinking academia in a time of climate crisis. *eLife*, 12, e84991. <https://doi.org/10.7554/eLife.84991>
- [23] Díaz, M. R. G. A., León, V. E. P., & Saguar, P. F. (2024). How close are European countries to the doughnut-shaped safe and just space? Evidence from 26 EU countries. *Ecological Economics*, 221, 108189. <https://doi.org/10.1016/j.ecolecon.2024.108189>
- [24] Goodwin, K., Li, M. Y., & Wiedmann, T. (2025). Exploring the safe and just space for urban and regional Australia. *npj Urban Sustainability*, 5(1), 24. <https://doi.org/10.1038/s42949-025-00210-4>
- [25] Gucciardi, G., & Luzzati, T. (2024). Living in the 'doughnut': Reconsidering the boundaries via composite indicators. *Ecological Indicators*, 169, 112864. <https://doi.org/10.1016/j.ecolind.2024.112864>
- [26] Everett, E. (2022). Combining the circular economy, doughnut economy, and permaculture to create a holistic economic model for future generations. *Environmental Sciences Proceedings*, 15(1), 19. <https://doi.org/10.3390/environsciproc2022015019>
- [27] Turner, R. A., & Wills, J. (2022). Downscaling doughnut economics for sustainability governance. *Current Opinion in Environmental Sustainability*, 56, 101180. <https://doi.org/10.1016/j.cosust.2022.101180>
- [28] Mont, O., Neuvonen, A., & Lähteenoja, S. (2014). Sustainable lifestyles 2050: Stakeholder visions, emerging practices and future research. *Journal of Cleaner Production*, 63, 24–32. <https://doi.org/10.1016/j.jclepro.2013.06.024>
- [29] Manzini, E. (2006). Creative communities, collaborative networks and distributed economies: Promising signals for a sustainable development. DIS, Indaco, Politecnico di Milano. <https://archive.org/details/ezio-manzini-06-01-06-creative-communities-collaborative-networks-distributed-economies>
- [30] Bofylatos, S., & Telalbasic, I. (2019). Service startups and creative communities: Two sides of the same coin? *The Design Journal*, 22(3), 239–256. <https://doi.org/10.1080/14606925.2019.1595860>
- [31] Raworth, K. (2012). A safe and just space for humanity: Can we live within the doughnut? *Oxfam Policy and Practice: Climate Change and Resilience*, 8(1), 1–26. <https://doi.org/10.21201/2012.2364>
- [32] Castro-Arce, K., & Vanclay, F. (2020). Transformative social innovation for sustainable rural development: An analytical framework to assist community-based initiatives. *Journal of Rural Studies*, 74, 45–54. <https://doi.org/10.1016/j.jrurstud.2019.12.010>
- [33] Deniz, D. (2021). Sustainable design thinking and social innovation for beating barriers to circular economy. *WIT Transactions on Ecology and the Environment*, 253, 219–226. <https://doi.org/10.2495/ECOPOWER210191>
- [34] Kim, B. (2023). Systems design thinking for social innovation: A learning perspective. *Business and Society Review*, 128(2), 217–250. <https://doi.org/10.1111/basr.12298>
- [35] Hill, J. C., Hains, K., Hains, B., & Hustedde, R. (2022). A social innovation approach to programming to address social issues. *Community Development*, 53(3), 345–354. <https://doi.org/10.1080/15575330.2022.2045358>
- [36] Pel, B., Haxeltine, A., Avelino, F., Dumitru, A., Kemp, R., Bauler, T., Kunze, I., Dorland, J., Wittmayer, J., & Jørgensen, M. S. (2020). Towards a theory of transformative social innovation: A relational framework and 12 propositions. *Research Policy*, 49(8), 104080. <https://doi.org/10.1016/j.respol.2020.104080>
- [37] Docherty, C. (2017). Perspectives on design thinking for social innovation. *The Design Journal*, 20(6), 719–724. <https://doi.org/10.1080/14606925.2017.1372790>

- [38] Piłat, P. (2024). Designing the design: Application of design thinking to social innovation planning. *Zeszyty Naukowe. Organizacja i Zarządzanie / Politechnika Śląska*, 193, 317–341. <https://doi.org/10.29119/1641-3466.2024.193.18>
- [39] Pamplona, L., Estellita Lins, M., Xavier, A., & Almeida, M. (2024). Transformative social innovation as a guideline to enhance the sustainable development goals' framework. *Sustainability*, 16(16), 7114. <https://doi.org/10.3390/su16167114>
- [40] Doughnut Economics Action Lab (DEAL). (n.d.). Doughnut unrolled: Community portrait of place (version 1.0). Retrieved September 8, 2026, from <https://doughnuteconomics.org>
- [41] Recordon, J., Gilloots, C., Brunner, D., & Fragnière, A. (2025). The doughnut framework: From theory to local applications in Switzerland—Literature review & practical lessons. *Journal of Cleaner Production*, 505, 145440. <https://doi.org/10.1016/j.jclepro.2025.145440>
- [42] Griffin, A. S., Callen, A., Klop-Toker, K., Scanlon, R. J., & Hayward, M. W. (2020). Compassionate conservation clashes with conservation biology: Should empathy, compassion, and deontological moral principles drive conservation practice? *Frontiers in Psychology*, 11, 1139. <https://doi.org/10.3389/fpsyg.2020.01139>
- [43] Veloso Gomes, P., Marques, A., Pereira, J., Pimenta, R., Donga, J., & Simões de Almeida, R. (2024). Using immersive environments in e-mental health rehabilitation programs directed to future health professionals to promote empathy and health literacy about schizophrenia. *Healthcare*, 12(15), 1550. <https://doi.org/10.3390/healthcare12151550>
- [44] Muratovski, G. (2023). In conversation with Ezio Manzini: Design for social innovation—What we've learned so far. *She Ji: The Journal of Design, Economics, and Innovation*, 9(1), 76–85. <https://doi.org/10.1016/j.sheji.2023.05.001>
- [45] Nandan, M., Singh, A., & Mandayam, G. (2019). Social value creation and social innovation by human service professionals: Evidence from Missouri, USA. *Administrative Sciences*, 9(4), 86. <https://doi.org/10.3390/admsci9040086>
- [46] Von Jacobi, N., Chiappero-Martinetti, E., Maestripieri, L., & Giroletti, T. (2024). Creating social value by empowering people: A social innovation perspective. *Annals of Public and Cooperative Economics*, 95(2), 413–439. <https://doi.org/10.1111/apce.12436>
- [47] Ceschin, F. (2014). How the design of socio-technical experiments can enable radical changes for sustainability. *International Journal of Design*, 8(3), 1–21. <https://www.ijdesign.org/index.php/IJDesign/article/view/1308/650>
- [48] Røkås, T., & Gómez-Baggethun, E. (2025). Defining a safe and just operating space for the Norwegian economy. *Ecological Economics*, 230, 108511. <https://doi.org/10.1016/j.ecolecon.2025.108511>
- [49] Ferretto, A., Matthews, R., Brooker, R., & Smith, P. (2022). Planetary boundaries and the doughnut frameworks: A review of their local operability. *Anthropocene*, 39, 100347. <https://doi.org/10.1016/j.ancene.2022.100347>
- [50] Hossain, M. S., & Ifejika Speranza, C. (2020). Challenges and opportunities for operationalizing the safe and just operating space concept at regional scale. *International Journal of Sustainable Development & World Ecology*, 27(1), 40–54. <https://doi.org/10.1080/13504509.2019.1683101>