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Design Research towards socio-technical complex systems: A designerly systemic impact of Tourism value-chain

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Abstract:
The willingness to investigate and increasingly tackle complex phenomena becomes a requirement that leads many researchers to move towards Design which deals more and more with Systems. This opens up the Design discipline to move towards the value chain level and also to lead and reframe newly established research domains. But how can we measure the impact that Design has on these new contexts at the meso scale? This paper suggests that to do so, we must start with needs directly arising from and outside the Academia, taking advantage of European funds to co-design with stakeholders by experimenting. The tourism value chain is the one selected, characterised by a highly complex and fragmented number of stakeholders and activities, marked by a business-as-usual model. Decision-makers are increasingly striving for a sustainable sector transition; hence the Design research community is advancing systemic reflections on co-creating sustainable and impactful strategies.

Keywords: Systemic Design, Participatory Approach, Policy, Tourism Value-Chain

1. Introduction

Doctoral programmes in Design were among the last to emerge within the academic world. In certain universities around the world, the PhD had already existed since the early 1900s (Pizzocaro, 2018). Still, nevertheless, the setting up of a specific and structured PhD programme for design only emerged after 2000. The main trend, however, is that the PhD in the Design field in most institutions has gained in size and formal positioning over the last three decades, especially in those universities embedded in contexts where design plays a crucial role in the ecosystem in which they are. Among the exemplars to be mentioned, we certainly have the Northwest of Europe with the Netherlands context. Then there is the whole Scandinavian and Anglo-Saxon sphere, where the role of design is recognised academically and as a profession and mindset capable of contributing to the well-being of the society in which it is located. Let's think about the UK Design Council, which since 2010 has made significant progress in helping governments, businesses, and communities to understand better what design is and the economic, social, and environmental benefits it brings. At the same time, the WDO, the World Design Organisation, has also been pursuing reflections and missions readily connected to understanding the design's impact on people's lives. At its heart, design has always been about finding a better way and improving quality of life (Papanek, 1984). For this reason, the design process, with its focus on the end users and the environment, can provide an innovative perspective, for example, on the international development agenda. For 60 years, WDO has been promoting

industrial design and its power to improve quality of life. Today, more than ever, the imperative for WDO as the world body for industrial design to amplify the voices of those designers who bring a new perspective to some of our planet's biggest economic, social, and environmental challenges. As an international NGO with United Nations consultative status, WDO is aligning its work to the universally accepted Sustainable Development Goals (SDGs) and their respective targets as the impetus for united and concerted action by some 400.000 designers they represent to position design as a catalyst for positive change in society.

By its own nature, as Geels (2004) emphasised, "*the discipline of design changes, adapts and seeks to mediate with other disciplines*" that may be more humanistic or technical and, of course, technological. To borrow Buchanan's expression, "*design represents an integrative discipline*" (1992) because the domains collaborating with Design do not always share the same methodologies or approaches. Still, they share a mutual interest in collaborating towards the realisation of innovative, disruptive research and projects to the degree that shifts the current paradigm (Peruccio et al., 2018). This trend is also, and perhaps above all, reflected in doctoral study and the topics it deals with.

Before embarking on a project, each Designer guides the research through questions to understand the state-of-the-art, the gaps to which they have not yet been able to provide answers so that they can respond to real needs and not create new ones. The same happens when undertaking doctoral research, in this case, the researcher with a background as a designer in our time does not, in most cases, aspire to solve problems through practical and tangible solutions. Design as research process, and designers play a crucial role in producing and managing information (Gianfrate & Iniguez, 2022).
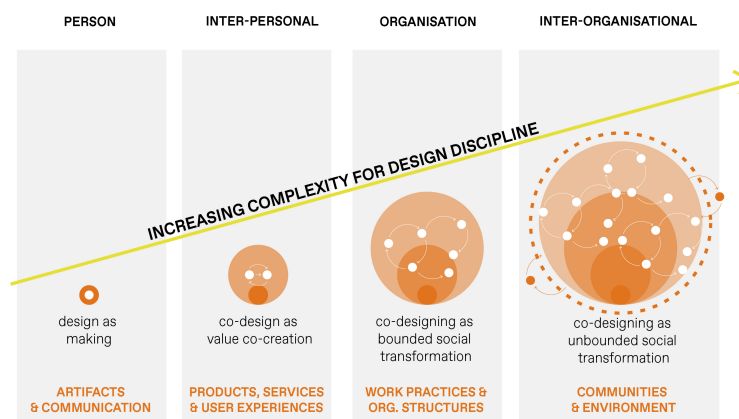

Fig.1 Four design domains with increasing social complexity. Adapted from P. Jones and van Patter (2009), P. Jones (2013, 2014) and (Ramiau & Malander 2004).

Today's many researchers in Design are inclined to deal with policies, meet stakeholders of different natures and backgrounds, and conduct research that is very often transdisciplinary in heart, stimulating continuous contaminations of knowledge and exchanges (Moreno & Villalba, 2018) that, in turn, influence and shape the nature of the discipline itself [Fig.1]. Addressing systemic and interconnected challenges, people with a PhD degree in Design often are transdisciplinary researchers. In this regard, Design has always been a promoter of this dialogue between disciplines, so it is already prepared to meet the demands of the society in which we live. Why do the nature of design and the academic research around this discipline change so easily over time? One prompt answer can certainly be found in the interdependence between discipline and the needs experienced by people in our society. Furthermore, another aspect to be considered is the anticipatory element (Celaschi et al., 2019) inherent in the domain, both when designing products or services and even more so when it comes to strategies and interactions with people, especially decision-makers.

2. Research background

Considering the interconnectedness existing between the different challenges of this century and the qualitative-oriented and holistic perspective (Battistoni et al., 2019) that should have in facing them, this paper aims to investigate how the doctoral researchers in the field of Design is moving more and more towards the design of relationships at the value-chain level. Not only between flows of matter but also in relation with people who live, generate value and impact, for the contexts where they are inserted. To deal with the above-emerging context, a planetary-centred approach (Poleac, 2023) is needed embrace a more than human perspective (Gaziulusoy et al., 2020). It is the emerging approach within Design for business and management scholarly research and practice to help businesses design better products and services without sacrificing their responsibility to the environment, to design innovative and regenerative solutions for human beings and for the planet (Reed, 2007). Thus, Design nowadays is working at Systems level concerns (Irwin, 2019) involving analysis of 'parts' within complex wholes and ecologies of systems. The researchers explore the role of design in sustaining, developing, and integrating human beings into broader ecological and cultural environments and shaping/adapting these environments. The present doctoral research stems from the desire to investigate which tools, methodologies and approaches that Design can provide to the actors of a local or regional context to a degree of co-developing shared strategic planning through a systemic approach. For this reason, the methodological framework from which it starts is the application and study of the Systemic Design, which is an inter-discipline increasingly discussed world-wide. Systemic Design born from the combination of Systems Theories and Design Practices, drawing from "designerly ways of knowing" (Cross, 2006) and dealing with "wicked problems" in socio-technical systems (Buchanan, 1992; Rittel & Webber, 1973), which are complex, ill-defined problems that traditional problem-solving methods cannot solve. Dealing with the complexity of the real world, such as climate change, sea-level rise, and food insecurity, and phenomenon like over-tourism, in which systemic designers are trained to analyse and synthesise complex problems by delivering visual artefacts (Sevaldson, 2022) to design innovative and interconnected solutions. Therefore, Design disciplines have developed a systemic approach that shows significant connections with the transition sciences, encompassing system analysis, multi-level design, and co-creation processes (Pereno & Barbero, 2020).

2.1. The Tourism Value Chain. Tackle the complexity through design

In accordance with the complex challenges and in response to the fact that design research can promote frameworks to address systemic issues at the value-chain level and with the stakeholders operating within. This work aims to investigate how to intervene in re-designing a business-as-usual oriented value-chain such as the Travel and Tourism one (T&T). This sector is characterised by a highly complex and fragmented value chain [Fig. 3], marked by a linear business model that needs design-driven innovation to disrupt their way of operating. Tourism can consume large quantities of energy, water, and plastics, which degrade the environmental quality of destinations and ecosystems, affecting the lives of residents.
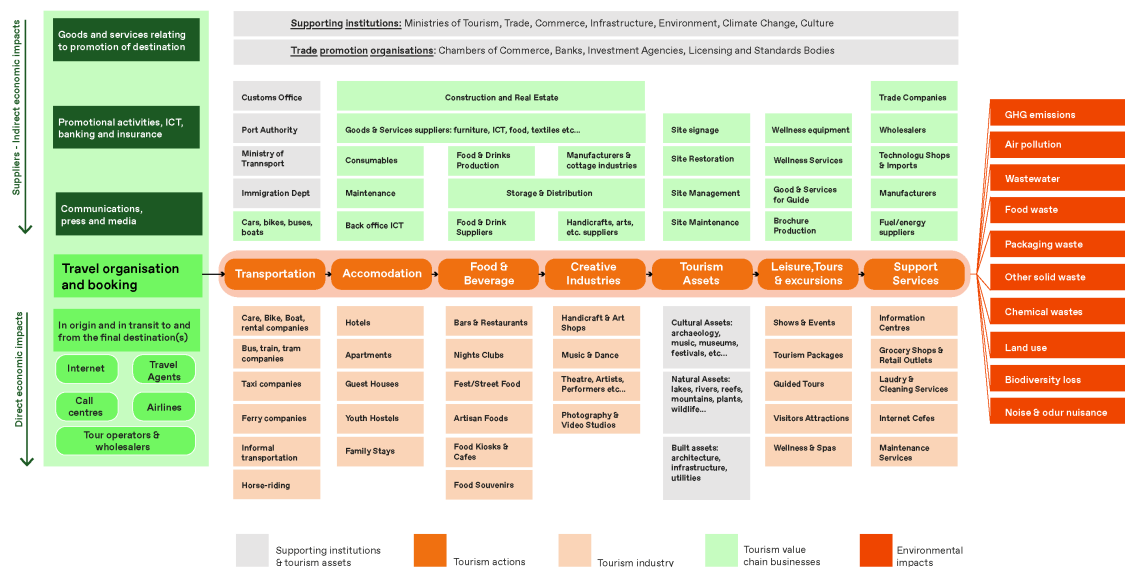
Supporting institutions: Ministries of Tourism, Trade, Commerce, Infrastructure, Environment, Climate Change, Culture

Trade promotion organisations: Chambers of Commerce, Banks, Investment Agencies, Licensing and Standards Bodies

Suppliers - Indirect economic impacts

- Goods and services relating to promotion of destination
- Promotional activities, ICT, banking and insurance
- Communications, press and media
- Travel organisation and booking

Direct economic impacts

- In origin and in transit to and from the final destination(s)
- Internet | Travel Agents | Call centres | Airlines | Tour operators & wholesalers

Customs Office	Construction and Real Estate			Site signage	Wellness equipment	Trade Companies
Port Authority	Goods & Service suppliers: furniture, ICT, food, textiles etc...			Site Restoration	Wellness Services	Wholesalers
Ministry of Transport	Consumables	Food & Drinks Production	Manufacturers & cottage industries	Site Management	Good & Services for Guide	Technology Shops & Imports
Immigration Dept	Maintenance	Storage & Distribution		Site Maintenance	Brochure Production	Manufacturers
Cars, bikes, buses, boats	Back office ICT	Food & Drink Suppliers	Handicrafts, arts, etc. suppliers			Fuel/energy suppliers

Tourism actions: Transportation | Accomodation | Food & Beverage | Creative Industries | Tourism Assets | Leisure,Tours & excursions | Support Services

Transportation	Accomodation	Food & Beverage	Creative Industries	Tourism Assets	Leisure,Tours & excursions	Support Services
Care, Bike, Boat, rental companies	Hotels	Bars & Restaurants	Handicraft & Art Shops	Cultural Assets: archaeology, music, museums, festivals, etc...	Shows & Events	Information Centres
Bus, train, tram companies	Apartments	Nights Clubs	Music & Dance		Tourism Packages	Grocery Shops & Retail Outlets
Taxi companies	Guest Houses	Fest/Street Food	Theatre, Artists, Performers etc...	Natural Assets: lakes, rivers, reefs, mountains, plants, wildlife...	Guided Tours	Laudry & Cleaning Services
Ferry companies	Youth Hostels	Artisan Foods	Photography & Video Studios		Visitors Attractions	Internet Cefes
Informal transportation	Family Stays	Food Kiosks & Cafes		Built assets: architecture, infrastructure, utilities	Wellness & Spas	Maintenance Services
Horse-riding		Food Souvenirs				

Environmental impacts: GHG emissions; Air pollution; Wastewater; Food waste; Packaging waste; Other solid waste; Chemical wastes; Land use; Biodiversity loss; Noise & odur nuisance

Legend: Supporting institutions & tourism assets | Tourism actions | Tourism industry | Tourism value chain businesses | Environmental impacts

Fig.3 Tourism linear industry value chain. Schema based on Epler Wood, M (2017).

Due to Covid-19, the sector got financial losses by the complex network of businesses reliant on tourism (Knezevic Cvelbar et al., 2021). This reminded us that sustainability transitions require long-term thinking to envision how livelihoods can adapt to lifestyle changes required for the mitigation of climate change (Gaziulusoy et al., 2020). Decision-makers are increasingly striving for a sustainable sector transition; hence the research community is advancing systemic reflections on a regenerative culture of tourism (Dredge, 2022). Design can support this new scenario, exploring how tourism can generate social, environmental, and economic value and well-being, improving sustainable travel experiences and behaviours. These include designing and managing sustainable dynamics through stakeholder engagement practices, mapping and using data and digital information, designing communication, optimised the matter's flows for supporting the sector's transition.

Time and again, the design discipline has questioned the scale and scope of its investigation, moving from product innovation to service and systems development. For this reason, the choice to focus on the tourism ecosystem stems from its complexity, which lies in the fact that the industry is deeply interconnected and dependent on multiple key resources and commodity chains, but these are currently structured with a linear mindset. Travel and tourism operators can act as promoters of circularity in a broader economic context and at the same time benefit from the systemic patterns that can be generated in industrial ecosystems. This includes developing systemic approaches that steer the behaviour of consumers towards sustainability and makes them participate. Furthermore, it is essential to dwell on the real meaning of sustainable tourism experiences that move towards regeneration processes of the local context.

2.2. The Sustainable multi-level transition and Design for Tourism

A sustainable transition of T&T's industry needs to balance the economic, social, and environmental aspects (Stoddard et al., 2012) and even cultural one, which cut across the first three. As the OECD (2021) states, rural communities and local populations who live off tourism-related activities – especially women and young people - have been the most affected by the pandemic. Moreover, those populations are also the ones most affected by climate change which, consequently, impacts on the social dynamics at the European and the global level (UNWTO, 2021).

Considering the social aspects of the sector, the job losses among seasonal and part- time workers have been severe due to the pandemic since protections have always been precarious for workers in

the different stages of the T&T value chain. As for the socio-economic consequences of the tourism industry as it has been treated so far, it becomes evident that a radical change is needed. Several high- profile international organisations are now developing policies, management principles, and certification guidelines for sustainable tourism development. However, the T&T industry is still far from balancing the three dimensions of sustainability, perpetuating its tremendous impact on our planet, our economies and the people who live off tourism. Therefore, a central aim of transition research is to conceptualise and explain how radical changes can occur in how societal functions are fulfilled. The unit of analysis is thus primarily situated at the 'meso'-level of socio-technical systems (Geels 2004). The focus of the research on sustainability transitions therefore differs from long-standing sustainability debates at the 'macro'-level (e.g. changing the nature of capitalism or nature-society interactions) or the 'micro'-level (e.g. changing individual choices, attitudes and motivations).

The theoretical frameworks and studies mention, most of the time, the sustainability transition (van den Bergh et al. 2011; Markard et al. 2012). These are the MultiLevel Perspective, the Technological Innovation System approach, Strategic Niche Management and Transition Management. They all take a systemic perspective to capture co-evolutionary complexity and key phenomena such as path-dependency emergence non-linear dynamics. Transitions are inherently political processes in the sense that different individuals and groups will disagree about desirable directions of transitions, appropriate ways to steer such processes, and that transitions potentially lead to winners and losers. The crucial factor to be exploited here is the possibility of inserting ourselves as design researchers into the political decision-making context to understand concretely what design opportunities with decision-makers and the impacts of research can have on the fate of our planet.

3. Research context

An aspect that defines the concrete possibility for doctoral research to measure its impact on society is to make a part of this research the basis for potentially fundable multi-stakeholder projects. In this regard, it is worth mentioning how many doctoral schools in Europe offer specific courses for writing related to "Euro planning" content. At the same time, even the application of a potential doctoral student, at the beginning of his or her career, often presupposes the writing of a project on which one is assessed. According to that, the European project funds panorama [Fig.04] gives us the opportunity to enter contexts that we would not otherwise have considered as designers and researchers.
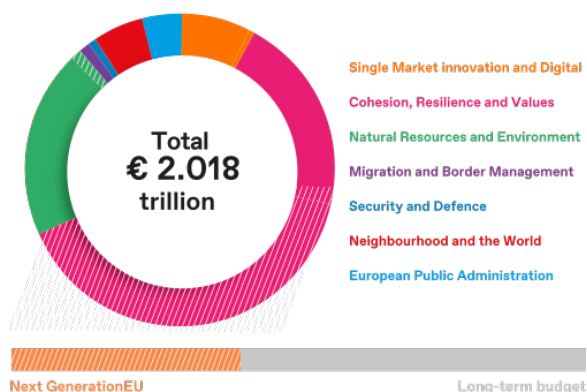

Fig.4 European funds allocated for the financial framework 2021-2027. (Aulisio et al, 2023).

For this specific research, the *Interreg Europe*, interregional cooperation programme co-funded by the European Union with the European Regional Development Fund (EDFR) was the one selected for the doctoral research of this paper, in pursuit of gaining insight into how academic research can be applied to the society. Besides, the European Union strives to reduce disparities in development,

growth, and quality of life in and across Europe's regions. The current Interreg programme contributes to this objective and runs from 2021 to 2027. In this specific case, the projects are funded to help local, regional, and national governments across Europe to develop and deliver better policies. This, to create an environment and opportunities for sharing solutions to regional development issues, helpful for a PhD student as case study research. This happens by supporting the exchange of good practices and policy learning among European regions in the EU27[1] together with Norway and Switzerland. Especially the investment programmes focused on growth and jobs and territorial cooperation, promoting the exchange of experience, innovative approaches and capacity building through the identification, dissemination, and transfer of good practices in regional development policies.

As discussed, the shift of Design towards complexity is undeniable, and our disciplines have proven to be able to apply innovative methods and processes to address complex socio-economic challenges. In today's T&T scenario, new tools of dialogue and planning with decision-makers and communities are needed to integrate a sustainable way of conceiving relations between parts of a place subject to tourist flows. The latter contribution of Design to the tourism system relates to a broader design scope which refers to policy design and co-design with different scales of stakeholders. Here, Design can show its potential as a facilitator, providing methods and tools to enhance, the envisioning capacity of stakeholders, through creativity. The interregional cooperation context proves to be a good one in which to test these new design-driven strategies.

In this panorama, for the Interreg Europe Programme, the Community framework for cohesion policies envisages that the programming and investment choices of the Member States should be declined according to five Policy Objectives identified at the EU Community level, which are related to Europe: 1) greener 2) more connected 3) more social 4) closer to citizens 5) with better regional governance. Focusing on the territorial dimension, cohesion policies aim to build Europe closer to its citizens (Policy Objective 4) by promoting sustainable and integrated development of urban, rural and coastal areas with local and transferable initiatives.

3.1 Developing Projects between academia and beyond

The SYSTOUR project, which is the case study of the present paper, envisages cooperation initiatives to foster entrepreneurship and innovation in tourism initiatives, to improve the integrated accommodation system between wetlands and rural areas, to support the exchange of best practices between sustainable tourism models to diversify the touristic flows. Enhancing the potentialities of non-urban rural areas is one of the objectives by connecting the potentialities and the visibility of those areas. Figure 5 illustrates the tasks to be implemented by the project over the next years, which will be led by a team of researchers, professors, and a PhD student in Systemic Design (SD), who will use the methods and tools of the SD methodology to develop innovative, design-driven solutions with the partners involved.

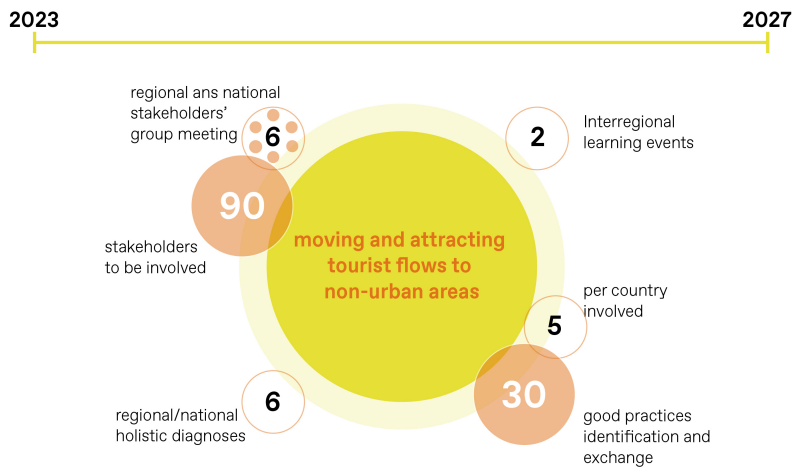[1] https://european-union.europa.eu/principles-countries-history/country-profiles_en

Fig.5 Synthetic schema on SYSTOUR project structure (Authors,2023).

Thus, by combining research interest and the work done during the PhD course, it was defined how to follow up on the elements that emerged from the formal academic and grey literature review. Many residents of the EU's rural and wetland communities' benefit from a high quality of life that cannot be achieved in cities and suburbs. However, these areas do not take care of their attractiveness and the infrastructural landscape elements that characterise them. Major changes in how we live to provide an opportunity to reshape the economic relationship between different parts of the country and for rural and coastal communities to make a substantial and lasting contribution to the EU's sustainable prosperity. Tourism can play an important role in improving the attractiveness and well-being of places, not only as destinations to visit but also to live, work and invest. More specifically, tourism can benefit regional economies, including diverse employment opportunities, support for promoting cultural authenticity and assets, opportunities for innovative small-scale business operations, and support for infrastructure-related development and maintenance. These prerogatives need to be addressed not only by providing incentives and funds, but also by designing ways in which certain activities can be favoured over others, and by fostering mutual dialogue with the decision-makers of the places.

The policy is applied to aid tourism dispersal away from honeypot areas experiencing pressures from heavy visitor flows. While such high tourism concentrations are usually limited to a small number of well-known, mainly urban destinations, the desirability of spreading the load is shared, with governments now developing specific measures to deliver the policy intention. The location, capacity, efficiency, and connectivity of transport also play a significant role in how destinations physically develop by influencing visitor mobility and experiences within destinations. Good accessibility is instrumental to the overall competitiveness of destinations and is necessary to spread the benefits of tourism beyond major centres. However, the analysis of the context in which one is going to plan is also fundamental. Hence, a systemic mindset is required, one that can understand the complexity that surrounds us and redesign it with a holistic perspective, aimed at creating positive impacts on the whole system. In this regard, guiding stakeholders through visualising complexity and interpreting it is at the core of Systemic Design research activities through the established method of Holistic Diagnosis (HD) and Gigamapping, as theorised by the Polytechnic University of Turin and the Oslo School of Architecture and Design respectively (Battistoni et al., 2019; Sevaldson, 2022).

3.2 The Social impact and tools to frame the Design value within projects

The Design researchers explore the role of the discipline in sustaining, developing, and integrating human beings into broader ecological and cultural environments and adapting the latest by shaping of new local or regional education policy; redesign of national voting system; redesign of a national tax system; design of niche transition experiments. The mediation attitude of Design must be embedded in the macro framework of decision-making dynamics, where its contribution as a system facilitator can have a tangible impact within a complex socio-technical industrial ecosystem. Therefore, research in Design is increasingly expanding, trying to understand what tools and methodologies can foster multi-stakeholder dialogue to support the definition of government action plans, encourage transition pathways between industry and decision-makers, and drive funding programmes at local and international levels. Indeed, a starting point can be outlined in the research areas that Jones and Kijima (2018) define as co-evolving fields of 'design-led systemics', grouping them under the umbrella of Systemic Design, to distinguish from Systems Design disciplines related to engineering and hard sciences: Design for Territory, Design for Sustainability, Systems Oriented Design, Transition Design or Design for Social Innovation. The facilitator component of Design has always been brought to light by defining interpersonal and cross-cutting dynamics with stakeholders, communities, and decision-makers for the good of places and the people who inhabit them. The common point of all the above approaches is declining the design action according to a strategic way of acting (Manzini, 2010).

The tools and methodologies of Design are thus harnessed at the service of parties with different backgrounds to co-design through creative processes aimed at fostering collaboration between different actors and competencies acting at different scales of the project with multiple objectives (Hyysalo et al., 2019) The participatory concept thus covers different levels, from the redefinition of power to the growth of awareness and the sharing of practices and objectives (Villari, 2021). In particular, Systemic Design has developed specific tools to frame existing systems, usually relying on the design's ability to visualise problems and frame complexity (Pereno & Barbero, 2020).

Given the dialogue that is taking place between the scientific community in Design and decision-makers at the various levels and in the different application contexts. The purpose of this paper is to define a monitoring protocol for the quali-quantitative measurement of the impact that the systematised competences of research in Design can generate within the SYSTOUR project. To this end, several tools made available by agencies, universities and research groups were chosen and then the one most suitable to support the objective of the analysis was selected.

This monitoring will be carried out and presented after the first semester of the project. For this reason, two categorisations will be carried out in parallel to draw up a comparison on the impact of the discipline:

- Evaluate, using a tool developed by Design, policy actions and good practices designed by non-designers. In comparison to evaluation tools proposed by the Interreg programme

- Evaluate, using a tool developed by Design, the activities carried out during the project, managed, and coordinated by designers

The following table [Tab.1] shows which frameworks were examined by the author and which characteristics were considered to make a comparison between the different models. The investigation of these tools involved an initial skimming of the agencies at European level concerned with understanding how Design is impacting society, and among these the choice fell on the Design Council. Secondly, we looked for assessment tools designed by the collaboration between academia and the private sector, and among these we selected a Nordic organisation that has made systemic

design its core business through collaboration with a university. Finally, a platform created within a university was selected to measure the impact of design towards societal transition.

Table 1. Design tools to measure social impacts. Authors, 2023

Tools	Open Access	Guide provided	Field of application	Key components
Playbook for systemic innovation By Halogen Studio (NO)	Not	Not	Systemic Design Consultancy	Iterative stages of systems thinking, oriented towards innovation
Design Impact Transition (DIT) **platform** By Erasmus University (NL)	Not	Yes	Economy and Design Professional Academia	Guidelines, best practice archives.
Design Value **Framework** By Design Council (EN)	Yes	Yes	Design Consultancy Academia	Creative, visual, and tangible methods for valuing

Following the assessments provided by the identified tools, the selection fell on the Design Value Framework (DVF) presented by the Design Council. The criteria considered were those related to accessibility, as it is an open tool with simplified graphics useful for dialoguing with institutions and subjects outside the field of design. This allows us to explore multiple aspects with respect to the impact and value that design interventions have on the results of the projects analysed. Social impact is one aspect of this framework, it does not represent the totality, but all the elements taken into consideration have a cross-cutting vision that enhances their interdependence. In contrast to the other tools examined, the DVF does not emphasise a specific declination of design but considers the role of designers both as practitioners and as academics and what impact they generate on the context through the projects examined.
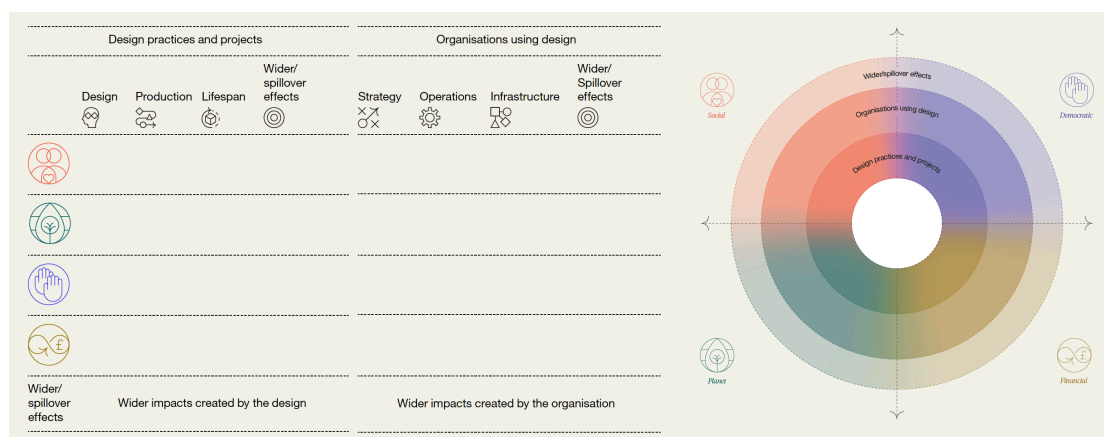

Fig.6 An extract of the DVF template provided by The Design Council to be completed. (The Design Council, 2022).

4. Discussion and conclusions

Stakeholders will be active participants of the policy-making process as well in strong collaboration with the SYSTOUR project representing the whole range of contributors and beneficiaries of the regional development process. Within this framework of political-territorial innovation, Doctoral Education in Design is at the forefront for the sustainable transition not only of production processes but also of territorial value chains that produce considerable induced activity in the various contexts of Europe.

Policies for growth and employment in the tourism sector, together with territorial cooperation, will implement two main approaches to the value chain level:

1. SYSTEMIC APPROACH, allowing to comprehensively cover the sustainable tourism management value chain of the regions to find synergies and complementarities between existing measures, programs, and models of the participating regions.

2. BOTTOM-UP APPROACH, allowing project partners to escalate from the regional level to the EU level through identifying measures, programs, and models of sustainable tourism sectors

Investigations such as these can yield measurable impacts through a matrix, which in the specific case of design research can lead the latter to make the leap to a discipline increasingly inclined to be valorised as bibliometric in the following future.

5. Limitations and future works

We are in an era of profound transformations which have an impact on our daily lives, are not only technological but also social and cultural. As a result, cross-sectoral trends are advancing, requiring the design field to be aware, responsive and, above all, anticipatory.

The current research explores the implications of the transformations from the specific perspective of design research in implementing co-design processes with stakeholders in the tourism sector. Specifically, answering the following question, how and to what extent do these issues require a review of current processes, practices, and business models? And how can doctoral research in Design address them through its methods and tools?

References

Battistoni C, Giraldo Nohra C, Barbero S. (2019) A Systemic Design Method to Approach Future Complex Scenarios and Research Towards Sustainability: A Holistic Diagnosis Tool. *Sustainability*. 11(16):4458. https://doi.org/10.3390/su11164458

Buchanan, R. (1992). Wicked Problems in Design Thinking. Design Issues, 8(2), 5-21.
https://doi.org/10.2307/1511637

Celaschi F., Formia E., Iñiguez Flores R., León Morán R., Design Processes and Anticipation, in: Handbook of Anticipation. Theoretical and Applied Aspects of the Use of Future in Decision Making, Cham, Springer International Publishing, 2019, pp. 773 – 793

Cross, Nigel. (2006). Designerly Ways of Knowing. DOI: 10.1007/1-84628-301-9.

Dredge, D. (2022). Regenerative tourism: transforming mindsets, systems and practices. *Journal of Tourism Futures*, 8(3), 269–281. doi: 10.1108/JTF-01-2022-0015

Knezevic Cvelbar, L., Antonucci, B., Cutrufo, N., Marongiu, L., Rodrigues, M., Teoh, T. (2021). Research for TRAN Committee – Relaunching transport and tourism in the EU after COVID-19 – Tourism sector, European Parliament, Policy Department for Structural and Cohesion Policies, Brussels

Gaziulusoy, İ., Veselova, E., Hodson, E., Berglund, E., Öztekin, E. E., Houtbeckers, E., Hernberg, H., Jalas, M., Fodor, K., & Ferreira, M. (2021). View of Design for Sustainability Transformations: A Deep Leverage Points Research Agenda for the (Post-)Pandemic Context. *Strategic Design Research Journal*, 13. http://revistas.unisinos.br/index.php/sdrj/article/view/sdrj.2021.141.02/60748414

Geels, F. (2004). From sectoral systems of innovation to socio-technical systems: insights about dynamics and change from sociology and institutional theory. *Research Policy*, 33(6/7), 897-920. https://doi.org/10.1016/j.respol.2004.01.015

Gianfrate, V., & Iñiguez Flores, R. (2022). Geographies of Design innovation: cultural drivers and global-local flows . *Diid — Disegno Industriale Industrial Design*, (77), 14. https://doi.org/10.30682/diid772022a

Jones, P.H., & Kijima, K. (eds.) (2018), Systemic Design: Theory, Methods, and Practice. Tokyo, Japan: Springer.

Hyysalo, S., Perikangas, S., Marttila, T., & Auvinen, K., (2019). Intermediate Codesigning in Transitions Governance: Catalysing and channelling participant action. *Design Journal*, 22(6), 873-894. https://doi.org/10.1080/14606925.2019.1661557

Manzini, E. (2010). Small, Local, Open and Connected: Design for Social Innovation and Sustainability*, The Journal of Design Strategies*, 4(1), 8-11.

Moreno, L. A., & Villalba, E. R. (2018). Transdisciplinary Design: Tamed complexity through new collaboration. *Strategic Design Research Journal*, *11*(1), 42.

Design Impact & Transition (DIT) Platform. (2021). The Design Impact Transition (DIT) platform: our narrative of change. Erasmus University Rotterdam.

Pereno, A., Barbero, S. (2020). Systemic design for territorial enhancement: An overview on design tools supporting socio-technical system innovation. Strategic Design Research Journal. 13. 113-136. 10.4013/sdrj.2020.132.02.

Peruccio, P., Vrenna, M., Menzardi, P., Savina, A. (2018), From "The limits to growth" to systemic design: Envisioning a sustainable future. In *Cumulus* Conference Proceedings Wuxi 2018 Diffused Transition and Design Opportunities, pp. 751-759.

Pizzocaro, S. (2018), 'Theory as habitus for scholarly design research'*, Artifact: Journal of Design Practice*, 5:2, pp. 1.1–1.16, doi: 10.1386/art_00001_1

Poleac D. (2023) Responsive Design Thinking: Transitioning from Human-Centered to a Planetary-Centric Approach to Innovation. Principles and Perspectives. In: Negruşa AL, Coroş MM (eds) Remodelling Businesses for Sustainable Development. Springer Proceedings in *Business and Economics*. Springer, Cham. DOI: 10.1007/978-3-031-19656-0_1

Reed, B. (2007). Shifting from 'sustainability' to regeneration, *Building Research & Information*, 35:6, 674–680, doi: 10.1080/09613210701475753

Rittel, H.W.J., Webber, M.M. (1973). Dilemmas in a general theory of planning. Policy Sci 4, 155–169. doi:10.1007/BF01405730

Sevaldson, B. (2022). Designing Complexity. The Methodology and Practice of Systems Oriented Design. Common Ground Research Networks, Champaign, Illinois.

Stoddard J. E., Pollard C. E., & Evans M. R. (2012), The Triple Bottom Line: A Framework for Sustainable Tourism Development, *International Journal of Hospitality & Tourism Administration*, 13:3, 233-258, doi: 10.1080/15256480.2012.698173

Villari, B. (2021). The empathic (r)evolution. Lessons learned from Covid-19 to design at the community, organization, and governmental levels. *Strategic Design Research Journal*, 14(1), 187–198. doi:10.4013/sdrj.2021.141.16

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