The Twin Transition and Flexible Work Arrangements: A Systematic Literature Review

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Abstract

The primary objective of this study is to conduct a systematic literature review on the interaction between new forms of flexible work arrangements and the twin transition (digital and green). The core concept of the twin transition is to achieve more productive and efficient systems through technological advancements while fostering a more sustainable work environment, production, and society. Flexible work arrangements encompass all possible agreements between employers and employees that differ from traditional full-time work at the employer's premises. The systematic literature review examines the studies downloaded from the Scopus and Science Direct databases, subsequently applying a rigorous multi-step selection process. The results indicate that literature on the relationship between the twin transition and flexible working arrangements is still in its infancy. Most of the papers are related to (i) the impact of flexible work arrangements on energy consumption, (ii) the need for complex and targeted policies to bring a just societal transition as well as a reorganization of the urban areas. A large part of the selected papers is related to the post-pandemic period, thus demonstrating how COVID-19 has been an accelerator of change. Finally, a large interest in the topic is present in Europe compared to the Anglosphere.

Keywords: Flexible work arrangements; Twin transition, remote working, teleworking, hybrid working.

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1. Introduction

The ongoing advancements in ICT technology, automation, and artificial intelligence significantly impact society and work. Simultaneously, the environmental crisis necessitates more sustainable lifestyles and production systems. The central idea of the green and digital transition (hereafter, twin transition) is to use technology to create more effective and productive systems, offer remote access to job opportunities and expand the labour market structure, while promoting more sustainable production, work environments, and society at large.

Flexible work arrangements (i.e., all potential agreements between employers and workers that deviate from regular full-time employment on the employer's premises) are rapidly spreading. Among these arrangements, we can refer to (i) "remote working"[2] (RW), defined as an arrangement where workers wholly or partially perform their tasks and duties from an alternative location to the default workplace (i.e., employer's/client's premises or public space)(ILO, 2020); (ii) "hybrid working", when workers just go to the workplace for a given number of days per week or month (Eurofound, 2022b); (iii) "digital nomadism", when workers can work remotely and travel simultaneously, autonomously choose the location where to work, and visit at least three locations a year that are not their own or a friend's or family home (Cook, 2023).

Within this context, the paper aims to develop a systematic literature review, following the PRISMA methodology (Page et al., 2021a; Page et al., 2021b, Pantelaki et al., 2021), on the relationship between the twin transition and the emerging flexible working arrangements.

While there is literature connecting one of the two transitions to some forms of flexible work arrangements, especially RW and digital transition, this is not the case when considering both transitions together. Therefore, the current paper aims to fill this gap in the literature.

The paper contributes to the existing literature by adding new insights into the linkage between flexible work arrangements and the twin transition. Moreover, as far as we know, it represents the first attempt to investigate this issue developing a systematic literature review with the PRISMA methodology.

Furthermore, the question of whether remote work can help reduce carbon emissions and energy consumption or potentially cause more harm than benefits to the environment is still open.

[2] The term remote working includes other flexible ways of working, such as teleworking, smart and agile working, as well as working from home (WFH).

Some scholars suggest that the final result can depend on specific policies concerning urban planning and the organization of workplaces. Specifically, the COVID-19 pandemic is seen as an accelerator of processes already in place (Amankwah-Amoah et al., 2021). Finally, digital nomadism and its intersection with the twin transition is still an unexplored area of research.

The paper is organized as follows. This introduction is followed by the theoretical background. Section 3 presents data and methodology. The results of the PRISMA analysis are discussed in section 4. Conclusions and further research bring the paper to a close.

2. Theoretical Background

In 2019, before the COVID-19 pandemic, the prevalence of RW in the European Union countries was very heterogeneous (Sostero et al., 2020). In northern Europe (Sweden, the Netherlands, Luxembourg, Finland and Denmark) 25% of employees worked remotely regularly or at least a few days per month. In contrast, in Italy, Cyprus, Romania and Bulgaria the percentages were much lower. This diversity finds its origin in certain structural factors typical of each of the European economies, such as the size of enterprises, specialisation in knowledge- and innovation-intensive sectors , organisational culture, and of course, the different regulatory frameworks also have a significant influence on the way companies manage work (Vargas Llave, 2006). The economic activities that are best suited to the remote working model are professional, scientific, technical, finance and insurance, and public administration (Barbieri et al., 2020).

During the pandemic, there was a significant increase in RW in most EU countries. The survey conducted by Eurofound indicates that in spring 2022 remote working overall has decreased: two out of three respondents work exclusively from the office (Eurofound, 2022b). With the easing of pandemic restrictions, many employees have returned to their employers' premises and working from home has decreased (12% of employees worked entirely from home in spring 2022). At the same time, hybrid work (e.g., performed partly remotely and partly at the place of work), has gained ground (the percentage of employees engaged in hybrid work increased from 14% in the summer 2020 to 18% in the summer 2022) and the majority of EU workers stated that they prefer working from home several times a week in the long run.

This choice impacts the economic, environmental, and social sustainability of the territories and is part of the strategies promoting the twin transition. The reduction in the number of trips to the office has an impact on traffic, congestion, and the environment, as it reduces the amount of carbon

emissions generated by transport. According to a study by Global Workplace Analytics[3], if the US workforce worked from home only half of the time, greenhouse gas emissions would be reduced by 54 million tons per year. The companies are also striving to become carbon-negative by 2030 through the promotion of remote and hybrid working. For example, Microsoft has pledged to remove from the atmosphere more carbon than it emits. Google has also committed to using 100 per cent renewable energy for its data centers and offices by 2030.

However, previous studies' results are not conclusive. On the one hand, there is a reduction in commuting, on the other hand, workers might use private cars more for leisure activities, shopping, etc. (E Silva, Melo, 2018; Eurofound, 2022a).

3. Data and methodology

The paper applies the PRISMA methodology to develop a systematic literature review on the relationship between the twin transition and flexible working arrangements.

The search for relevant records has been conducted through two databases: Scopus and Science Direct. The first phase of the search process involves the identification of keywords for constructing Boolean operators to be used in both Scopus and Science Direct. The following keywords with Boolean operators are introduced into the two systems:

- "remote work" OR "remote working" OR "telework" OR "teleworking" OR "hybrid work" OR "hybrid working" OR "working from home" OR "work from home" OR "digital nomad" OR "digital nomadism" OR "workation" AND "twin transition".

Considering that some papers may focus more on one of the two transitions but still retain some relevant parts of the other one, we proceed to use the same keywords[4] for the digital transition or the green transition as follows:

- For the digital transition: "remote work" OR "remote working" OR "telework" OR "teleworking" OR "hybrid work" OR "hybrid working" OR "working from home" OR

[3] https://globalworkplaceanalytics.com/.

[4] We drop “workation” in the following queries because apparently neither of the two database was able to properly recognized the word. Science Direct is able to identify 190 papers but none of them are about “workation” and most of them are duplicates of the previous queries.

"work from home" OR "digital nomad" OR "digital nomadism" OR "workation" AND "digital transition".

- For the green transition: "remote work" OR "remote working" OR "telework" OR "teleworking" OR "hybrid work" OR "hybrid working" OR "working from home" OR "work from home" OR "digital nomad" OR "digital nomadism" OR "workation" AND "green transition" OR "green transformation".

No filters have been applied to the searches. Both databases have been requested to check for all the years, in all parts of the records, for any typology of manuscripts (articles, contributions in books, books, etc.). The main idea is not to restrict the search only to the very few years since the concept of twin transition was conceived but instead to identify possible past papers where issues of different flexible work arrangements are connected with digital and green changes.

Scopus provided 148 records, and Science Direct 416, reaching a total of 564 records. Afterwards, duplicate records (85) have been removed, and other records were excluded because they were clearly outside the scope of the research (316).

A second step in the selection process is the screening phase. Firstly, we checked the abstracts of the remaining 163 records to understand if they could potentially be of interest considering the goal of the systematic literature review; 83 records have been excluded through this step. Afterwards, the remaining 81 records were assessed through all their texts for eligibility. The main criteria were the following:

- both aspects of the twin transition should be present, at least in part, in the text of the papers.
- At least one of the flexible work arrangements cited in the paper is mentioned at least twice.. This excludes simple citations of the literature in the introduction or in the literature review thus not adding particular new insights on the topic.

Finally, in total, the records included in the systematic literature review were 21. All the steps of the process are shown in Figure 1.

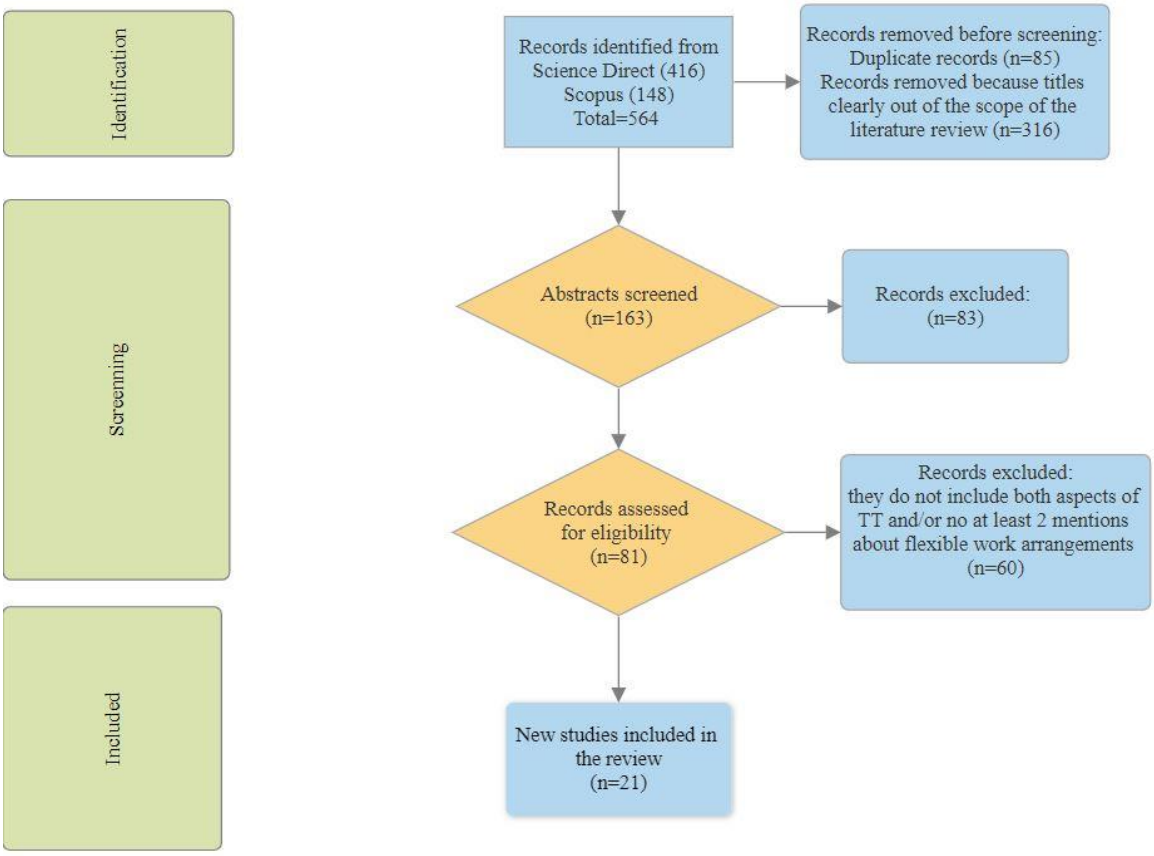

Figure 1: PRISMA flow chart

4. Results

The results of the selection process are presented in Table 1. The table presents: (i) the authors of the papers/chapters, mostly articles published in journal; (ii) the year of publication; (iii) the name of the journal or book and the title of the paper/chapter; (iv) the methodology use; (v) if COVID-19 is a very relevant part of the research; (vi) insights and/or results related to flexible work arrangements in the context of the twin transition.

Table 1: Results

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Lovelace and Philips (2014)	Geoforum	The 'oil vulnerability' of commuter patterns: A case study from Yorkshire and the Humber, UK	Case study/quantitative	no	Policies encouraging telecommuting need to be more targeted on different workers' typologies.
Elliot et al. (2020)	Environmental and Resource Economics	Suggestions for a Covid-19 Post-Pandemic Research Agenda in Environmental Economics	Policy analysis/qualitative	yes	Negative and positive effects of WFH. Post-pandemic green transition needed greater cultural, social, and political changes.
Elavarasan et al. (2021)	Sustainable Cities and Society	A hover view over effectual approaches on pandemic management for sustainable cities – The endowment of prospective technologies with revitalization strategies	Policy and scenarios analysis/SWOT analysis/qualitative	yes	The pandemic brought larger collaboration via RW among experts thanks also to social media connections. Economic growth in the upcoming years must pay attention to middle and low-income earners and RW plays a role.

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Mihai et al. (2021)	Sustainability	The Challenges of the Green Economy in Romania. Scientific Literature Review	Systematic literature review/qualitative	no	Twin transition can increase social exclusion. Telework has two opposing effects on an individual's well-being (paradox): autonomy and work-life balance, but detrimental impact on professional relationships and career.

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Noussan and Jarre (2021)	Energies	Assessing commuting energy and emissions savings through remote working and carpooling: Lessons from an Italian region	Quantitative	no	The potential contribution of RW to lower the GHG emissions is strongly connected to the diffusion of this arrangement across commuting trips. Increasing the amount of RW would bear more significant results if applied non-homogeneously across workers and, specifically, if based on commuting distance.
Angelidou et al (2022)	Technological Forecasting & Social Change	Emerging smart city, transport and energy trends in urban settings: Results of a pan-European foresight exercise with 120 experts	Survey/Qualitative	no	RW can remove the advantages of economies of scale related to mass public transport or organized working environments.

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Babapour Chafi et al (2022)	Sustainability	Post-pandemic office work: perceived challenges and opportunities for a sustainable work environment	Case study/Qualitative	yes	Hybrid work is preferable. Employers are expected to provide support and re-design the physical and digital workplaces for the employees. No clear relationship between energy consumption and RW.
Fouquet and Hippe (2022)	Energy Research & Social Science	Twin transitions of decarbonisation and digitalisation: A historical perspective on energy and information in European economies	Quantitative	no	The digitalisation has increased the ability of much of the workforce to work remotely during the pandemic. The pandemic has enhanced housing relocations outside urban centers, with both positive and negative impacts on transport use and associated energy consumption.

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Isensee et al. (2022)	Sustainability	Exploring the Use of Mobile Apps for Fostering Sustainability-Oriented Corporate Culture: A Qualitative Analysis	Qualitative	no	During the pandemic, businesses had to reorganize their processes and manage the new digital work environment (e.g., increasing the RW share). Collaboration and cooperation between leadership and employees on sustainability. Use of Apps that help to foster sustainability culture. Blue-collar workers might be neglected in the implementation of digital tools, home office opportunities and culture development.

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Roberto et al (2022)	Contribution of the book "Intelligent Environments - Advanced Systems for a Healthy Planet"	Smart working and flexible work arrangements: opportunities and risks for sustainable communities	Qualitative	no	Working remotely is not necessary for everyone. Teleworking is requested by both employees and employers but for different reasons. Workloads, longer and non-routine working hours can be a negative side of telework if the firm required high performance to the employees. Risk of isolation due to RW. Redevelopment initiatives should include coworking spaces. Debate energy consumption and telework still open. Possible issues on gender and social inclusion to consider.

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Baldassa et al (2023)	Case Studies on Transport Policy	Telework and MaaS adoption in a post-pandemic scenario. Evidence from municipal employees of Padua, Italy	Case study/mixed method	yes	Very high increase in telework after the pandemic in Italy. The diffusion of telework can negatively impact the choice to adopt MaaS (Mobility-as-a-Service). The number of people who work from home in a certain location should be considered in preliminary research regarding the possible diffusion of MaaS.
Böttcher et al (2023)	Information Systems Journal	Digital sustainable business models: Using digital technology to integrate ecological sustainability into the core of business models	Qualitative	no	Digital technology does not only optimize logistics or enable RW but implements sustainability as an integral part of the core logic of the organization (business model) and its identity.
Cassetti et al (2023)	Energy	The interplay among COVID-19 economic recovery, behavioural changes, and the European Green Deal: An energy-economic modelling perspective	Quantitative	yes	COVID-19 potential long-term consequences on EU citizens lifestyles (WFH included). Behavioral changes, required to achieve a net-zero transition, involve a wide range of sectors and modes. An increase in carbon prices may be alleviated by lifestyle changes, such as WFH and less air travel.

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Khanna et al (2023)	Energy Research & Social Science	Conceptualizing demand-side technological and social innovations in modeling pathways to carbon neutrality	Qualitative	no	Significant shifts towards telecommuting and e-commerce during the pandemic shutdowns. To reach carbon neutrality, lifestyle modifications (e.g., telecommuting) and altered urban forms will be required in addition to technology alternatives for transformation. Innovations still face multiple barriers to be overcome to ensure wider adoption.
Liu et al (2023)	Frontiers in Enviromental Science	Examining the role of digitalization and gig economy in achieving a low carbon society: an empirical study across nations	Quantitative	no	Increased Internet penetration stimulates more efficient and environmentally friendly solutions (e.g., RW, virtual meetings, and smart technologies), which can result in energy savings and reduced emissions. Gig economy workers are more likely to rely on flexible working arrangements. More research is required to evaluate the net environmental impact of telecommuting.
Morfeldt et al (2023)	Communications Earth & Environment	Emission pathways and mitigation options for achieving consumption-based climate targets in Sweden	Scenario analysis/quantitative	no	Increased RW can reduce commuting and the need for office space, but policies are required to encourage these behavioral shifts and prevent spillover effects that could raise greenhouse gas (GHG) emissions from the supply chain..

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Stermieri et al (2023a)	Energy Strategy Reviews	Impacts of digitalization and societal changes on energy transition: a novel socio-techno-economic energy system model	Quantitative/case study	yes	In Switzerland, teleworking lowers the demand for commuting by 10%. The savings on transport costs can then be used to fund the purchase of clean and efficient home technologies, which will offset the increased demand for energy in the home brought on by WFH. Teleworking has a net positive effect on energy consumption.

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Stermieri et al (2023b)	Energy Research & Social Science	Quantifying the implications of behavioral changes induced by digitalization on energy transition: A systematic review of methodological approaches	Systematic literature review/qualitative	no	Teleworking households are able to minimise the amount of trips and miles driven. Time saved due to a reduction in commuting can be reused by households to perform other activities. Since coworking spaces are typically found in residential neighbourhoods, people should use bicycles, public transportation, or walking rather than driving their own vehicles to reach the workplace.
Storey (2023)	The Extractive Industries and Society	From FIFO to LILO: The place effects of digitalization in the mining sector	Sysetmatic literature review/qualitative	no	New higher-skill-demanding jobs will be created with the introduction of new technologies, many of which can be performed remotely. When the supply chain is impacted by digitalization, people who work in indirect service and supply sector jobs will also feel similar effects. More mining activities can now be done remotely because to automation, data availability, and improved connectivity for the first time.

Author(s) and year	Journal/Book	Title	Methodology	Relevance of COVID-19	Insights/results
Tricchini and Baggio (2023)	First Monday	Digital sustainability: Ethics, epistemology, complexity and modelling	Qualitative	yes	RW will eventually transform urban economies through diverse ways of travelling, teaching, learning, and living. Not all job types had the same possibility to WFH, with certain noticeable restrictions and sociopsychological problems arising from remote working. Similar concerns about the detrimental consequences on work-life balance, the digital divide between industries and among employees (as not all occupations are "remotable"), surveillance, and productivity are being raised by the current WFH trend.
Wojnicka-Sycz et al (2023)	Innovation: The European Journal of Social Science Research	From adjustment to structural changes – innovation activity of enterprises in the time of COVID-19 pandemic	Mixed method	yes	Reducing the costs associated with office space may be another reason for sustaining distant work. RW increased from 1.2% before the pandemic to 8.8% during the lockdown and stayed at 5.3% afterwards in Italy. 54% of Russian enterprises switch to partial or full RW. RW may decrease the need for mobility and promote less-dense living which may contribute to lower pollution.

Figure 2 shows the subjects of the journals where the articles were published. The data are taken by scimagojr.com. Some journals can be related to more than one subject. Hence, one paper can be assigned to more than one subject. As it can be seen, the two principal subjects are related to energy issues. Indeed, the relationship between flexible work arrangements and the possibility of saving energy/reducing emissions is one of the main discussions in many of the selected papers (e.g., Noussan and Jarre, 2021; Angelidou et al., 2022; Babapour Chafi et al., 2022). The third and fourth most important subjects are "geography, planning and development" and "management, monitoring, policy and law". This can be related to how some authors suggested that behavioral changes need specific policies to avoid negative effects, such as social exclusion or isolation (e.g., Elliot et al., 2020; Mihai et al., 2021; Roberto et al., 2022) as well as a reorganization of the urban areas (Angelidou et al., 2022; Fouquet and Hippe 2022; Roberto et al. 2022; Stermieri et al., 2023b).

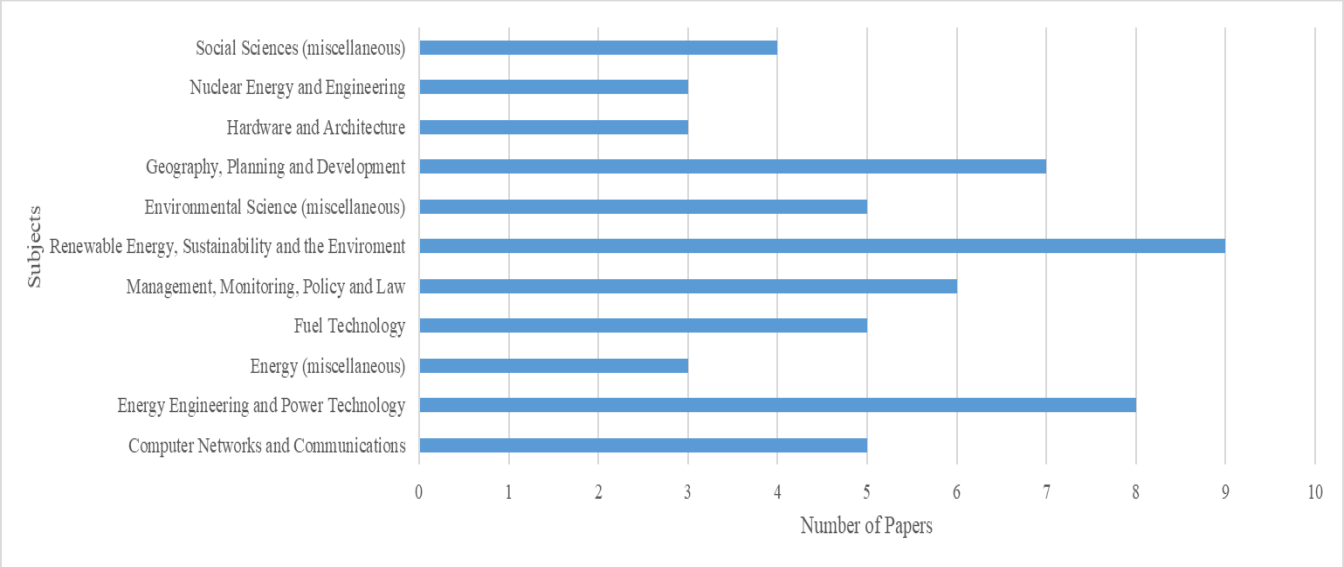

Figure 2: Principal subjects of the selected papers

Note: Only subjects with at least three papers are shown.

Figure 3 presents the year of publication (online) of the selected papers. It can be observed how the publications started to grow in 2020 and especially in the last two years. This is another element that shows how the pandemic was an accelerator (Roberto et al., 2022; Fouquet and Hippe, 2022; Wojnicka-Sycz et al., 2022) of the twin transition, and the academia and research institutions are now following the same path. Figure 4 illustrates how 57% (12) of the selected studies use qualitative methods, 33% (7) are based on quantitative methods, and the rest of the research employs mixed methodologies. Figure 5 shows how researchers based in Italian institutions are the most numerous authors of the selected records followed by Swedish and USA authors. It can be noticed that, in general, there is a bigger interest in the issues in Continental Europe (61) compared to Anglo-Saxons countries (16)[5].

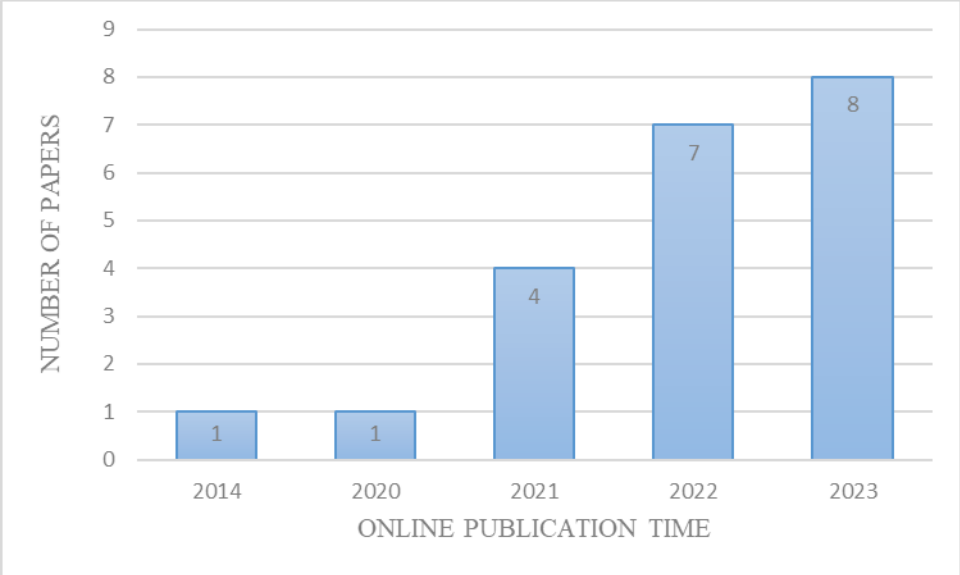

Figure 3: Year of publications of the selected papers

[5] Australia, Canada, UK, and USA.

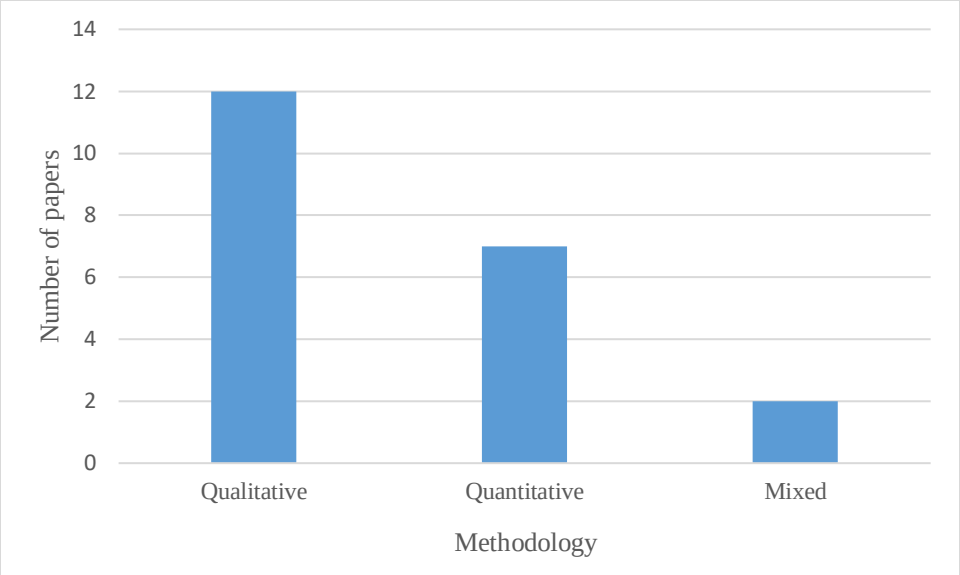

Figure 4: Methodologies of the selected papers

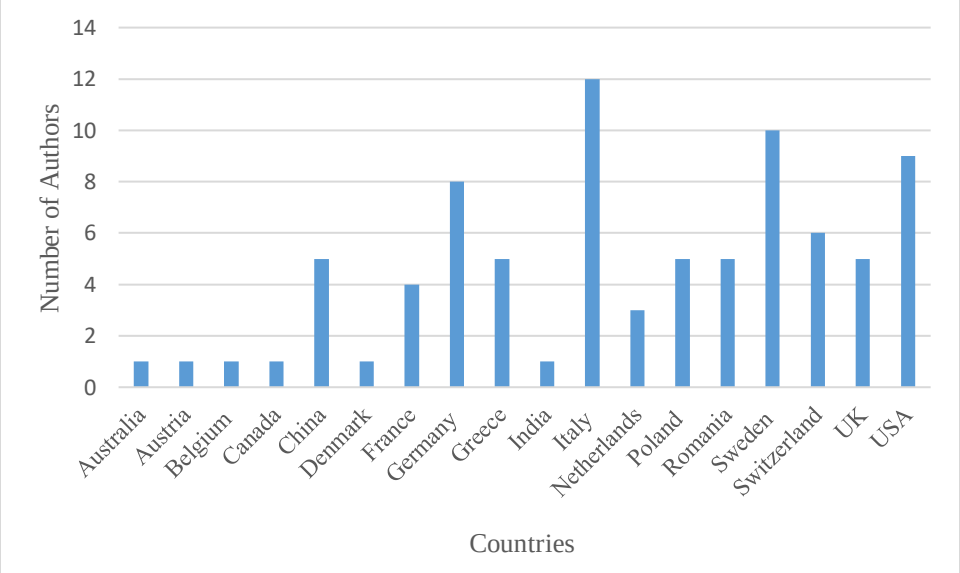

Figure 5: Number of Authors per country considering their affiliation

The existing literature on the twin transition and flexible work arrangements predominantly focuses on the effects of teleworking and remote working on energy consumption. Although most experts hold a positive stance regarding the potential of remote working to reduce energy consumption (Stermieri et al., 2023a; Cassetti et al., 2023; Khanna et al., 2023), some (Angelidou et al., 2022; Babapour Chafi, 2022; Baldassa et al., 2023, Roberto et al., 2022) caution against underestimating the negative effects should be considered. Negative effects arise from increased home electricity usage, the need for additional digital and energy-consuming infrastructures, and the allocation of saved commuting money to non-ecological purposes.

Another facet of the selected literature highlights concerns related to the risk of social exclusion. Some argue that the extensive use of flexible work arrangements may negatively impact the most vulnerable and less educated segments of the population or prevent them from fully exploiting such arrangements (Mihai et al., 2021; Isensee et al., 2022; Roberto et al., 2022; Storey, 2023). Moreover, without targeted policies (Lovelace and Philips, 2014; Morfeldt et al., 2023), other green initiatives could face setbacks (Baldassa et al., 2023). Consequently, a comprehensive framework of policies is necessary to make flexible work arrangements and other societal changes effective while mitigating inequalities (Elliot et al., 2020).

Additionally, a smaller yet significant body of literature (Fouquet and Hippe, 2022; Roberto et al., 2022) suggests that the intersection of flexible work arrangements and the changes brought about by the twin transition necessitates a reevaluation of urban spaces (Roberto et al., 2022), with coworking spaces potentially playing a crucial role (Roberto et al., 2022; Stermieri et al., 2023b).

The analysis of the selected literature indicates that the COVID-19 pandemic acted as a catalyst for policy changes and heightened scholarly interest in issues related to flexible work arrangements and the twin transition. Notably, most of the literature is grounded in qualitative studies, possibly due to the limited availability of data, especially regarding the relationship between flexible work arrangements and green policies. In addition, few studies are considering the impact of the twin transition combined with flexible work arrangements on territories (Lovelace and Philips, 2014; Mihai et al., 2021, Baldassa et al., 2023) and mostly are very specific case studies.

Furthermore, the studies predominantly focus on energy-related issues and policies, with a notable absence of analyses from the perspective of social scientists. A heightened interest in the topic is observed among continental European researchers, possibly influenced by delayed advancements in digitalization in specific European countries before the pandemic and the substantial public and EU institutional support for environmental issues.

Finally, it is noteworthy that the current literature lacks comprehensive coverage of digital nomadism. This represents a significant gap that warrants detailed exploration, considering the potential societal and environmental challenges posed by digital nomads.

5. Conclusions

The results reveal that the majority of the papers discuss how flexible work schedules affect energy use, how focused policies are needed to bring about a fair social change, and how urban areas should be reorganised. The post-pandemic era is covered in great detail in most of the chosen works. This illustrates how transformation has been accelerated via COVID-19. Lastly, compared to the Anglosphere, Europe has a greater interest in the subject.

A notable observation emerges from the limited number of studies exploring the impact of flexible work arrangements and the twin transition on territories. Moreover, these works are highly localized case studies. The existing body of literature falls short in offering a comprehensive examination of how various regions on a larger scale, such as Europe, respond to this evolving framework. This gap highlights the need for broader, more geographically diverse investigations to provide a greater understanding of the territorial implications.

Furthermore, there remains a noticeable disparity in the engagement of social scientists with the topic in comparison to scholars primarily interested in energy and urban planning. The current emphasis on energy-related and planning aspects has led to an underrepresentation of social science perspectives. A more inclusive and interdisciplinary approach, incorporating insights from social scientists, could contribute to a more comprehensive understanding of the societal implications of flexible work arrangements and the twin transition.

It is worth noting that analyses about digital nomadism are conspicuously absent in the existing literature. Given the rising prominence of digital nomads and their potential impact on society and the environment (Pettas, Advikos, 2023), further exploration and research in this area are warranted. Addressing these gaps will be crucial for developing a more nuanced and better understanding of the multifaceted dynamics associated with the twin transition and flexible work arrangements.

Lastly, little evidence has been provided about the role of third places like coworking spaces in enhancing near working strategies that can reduce commuting to the workplace. Few countries are promoting these strategies through specific public or private initiatives. In Italy the municipalities of Milan (Milano Strategia di Adattamento 2020) and Bologna (Smart Bo project), and the Emilia Romagna region[6] allow the employees of the public administration to work in coworking spaces near home, in urban and peripheral areas. In Ireland, the National Connected Hubs Network[7] belonging to the Rural Development Policy 2021-2025, specifically, to Ireland's National Remote Work Strategy, promotes remote working in rural Ireland by facilitating workers' or employers' relocation away from large urban centres. In France, the national association of third places "Tiers Lieux"[8] is supported by the government to enhance near working, thus reducing commuting, congestion, and pollution in large cities.

Strategies promoting the twin transition will have to take into account also the dynamics generated by remote and hybrid work, both at institutional (i.e., National Integrated Energy and Climate Plan) and industrial level (Mariotti, Rossi, 2023). Companies need to consider the increasingly frequent requests of workers to perform their work tasks remotely to guarantee them a better work-life balance.

Furthermore, the twin transition together with working arrangements could effectively reinforce regional capabilities for productivity and innovation of demographically declining and left-behind areas by increasing their attractiveness and accessibility to labour market opportunities. A recent Horizon project (MOBI-Twin[9]) aims to investigate whether twin transition can provide a novel

[6] See Piano integrato delle attività di organizzazione 2023-2025.
[7] Guidance for the Development of Hubs and Remote Working Facilities (https://www.connectedhubs.ie/files/CH-GuidanceDocForDevelopmentOfHubs.pdf); Hubs Classification System (https://www.connectedhubs.ie/files/AECHubsClassificationSystem-Master.pdf).
[8] https://francetierslieux.fr.
[9] https://mobi-twin-project.eu/

paradigm for territorial cohesion by better balancing spatial mobility patterns through the redefinition of regional attractiveness. While the digital transition can offer remote access to job opportunities and expand the labour market structure, the green transition can help left-behind areas innovate more by recombining their existing assets and resetting their productivity structure. Given this, twin transition may give rise to new patterns of spatial mobility in which areas that were previously deemed to be "sending" areas may become "receiving" regions as a result of shifting factors that contribute to regional appeal, such as sectoral structure, living standards, and environmental conditions. Further research should also focus on this aspect.

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