A Framework for Supporting Opportunities for Green Jobs and Sustainable Living

Peter Bradley[1], Mark Everard[2], Damian Whittard[1], Vasco Vendrame[1], Jon Mulholland[3], Joel Terwilliger[4],

[1]Department for Accounting, Economics and Finance, University of the West of England, Frenchay Campus, Coldharbour Lane, Bristol, UK, BS16 1QY.

[2] Department for Geography and Environmental Management, University of the West of England, Frenchay Campus, Coldharbour Lane, Bristol, UK, BS16 1QY, United Kingdom.

[3] Department of Social Sciences, University of the West of England, Frenchay Campus, Coldharbour Lane, Bristol, UK, BS16 1QY, United Kingdom.

[4]Centre for Environment and Sustainability. University of Surrey, Guildford, Surrey, GU2 7XH, United Kingdom.

Email: Peter.Bradley@uwe.ac.uk

Corresponding author: Peter Bradley

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ABSTRACT

This paper develops and presents a framework tool and research agenda for supporting opportunities for place-based green jobs and sustainable living that can be applied in cities. The framework can be used by academics, business and practitioners, government, and civil society to help understand the issues, interconnections, and relationships to help coordinate strategy, rapid action and investment to support place-based green jobs and sustainable living. In terms of approach, the 'five capitals' approach is integrated into an institutional economics framework, that has four levels (institutional environment, governance, resource allocation, and embeddedness), the framework is then presented and used to structure and organise inquiry of a research agenda. The framework is applied alongside literature to illustrate and highlight research gaps and key themes for future research in supporting opportunities for place-based green jobs and sustainable living. The paper identifies important synergies, system interconnections and future work relevant to business and policy makers interested in advancing green jobs and sustainable living.

1. INTRODUCTION

1.1 Ecological challenges facing society and business.

Humanity faces a linked series of existential and broader climatic, economic, food security and other threats stemming from rapid degradation of biodiversity and ecosystem services (IPBES, 2019; Dasgupta, 2021; Rockström *et al*., 2009; Bradshaw *et al*., 2021). The IPBES 2019 Global Assessment of Biodiversity and Ecosystem Services identified an unprecedented decline in nature and accelerating rates of species extinction, exerting significant impacts on economies, livelihoods, food security and quality of life. The Dasgupta Review (2021), as well as the

Millennium Ecosystem Assessment (2005), TEEB [The Economics of Ecosystems and Biodiversity] (2010) and IPBES, all identify the importance of adequately factoring in the plurality of values of natural capital into decision-making tools, and of understanding and exploring the role of changes in the social world, governance and the institutional environment (including law) to protect and restore biodiversity as a basis for more sustainable and resilient economic growth. Advancing towards more sustainable living can help address the challenge in part. UNEP (2023, 1) defines 'Sustainable livings as: "understanding how our lifestyle choices impact the world around us and finding ways for everyone to live better and lighter". Much of the embodied environmental impact of consumption are however largely determined by firms. Businesses are society's primary means for converting primary resources into useful products and services. Building the diversity of societal values of nature into the economy (consumption and production), would be one of the most powerful levers for change, creating a foundation for sustainable business and policy to serve current and future generations.

1.2 Investment and allocation of green employment to transition to green economy

In addressing key global environmental pressures relating to climate change and biodiversity many countries are setting targets, for example the UK has a legally binding target to bring greenhouse gas emissions to NetZero by 2050. The long-term biodiversity target for species' extinction risk is to reduce the risk of species' extinction by 2042, compared to the risk of species' extinction in 2022 (Legislation 2023). This said, there is often a lack of urgency in delivery and implementation. For example, in the UK Large-scale action and change in homes and businesses is needed in respect of climate change (Climate Change Committee, 2023). Transitioning to NetZero however, requires substantial investment. This investment will generate huge job and

skills opportunities; Ecuity (2020) estimate renewable and low-carbon technologies alone could support 1.38 million UK jobs by 2050 (as seen in Skidmore, 2022). Increases in green jobs can also help the implementation of circular and other pro-environmental practices often delivering cost reduction (Darmandieu et al 2021).

Job selection is a lifestyle choice with significant potential to contribute time, activities and resources to help achieve environmental sustainability, variable with job type and approach. Jobs provide economic security, wellbeing, identity, belonging and can feed back sustainability principles and practices into the broader lifeworld of employees, households and communities. Green employment can be defined as: "Employment in an activity that contributes to protecting or restoring the environment, including those that mitigate or adapt to climate change" (ONS 2023, 1). Opportunity for green jobs is often however not spread equally (HM Government 2022). In relation to green jobs, currently only 3% of those working in the environmental sector identify as from a minority (Policy exchange 2017). If the low carbon transition is executed well enabling opportunity for people, it can be more just and enjoy higher acceptance, support, and mandate. The implementation and transition to Net Zero is most effectively done at the local level (PCAN, 2023). Achieving acceptance, support and mandate is essential to ensure environmental action in democracies. Meeting targets such as those related to climate change, however requires huge investment and change in sectors to meet climate change targets (CCC 2023), it will be important for cities to foster such investments to generate substantial benefits to people and communities, as well as the environment. To ensure acceptance, however, local communities will need to feel they have agency in shaping the decisions and co-benefit from good jobs that they wish to see from investment in cities (rather than being largely extractive investments that benefit a small number of stakeholders). So, a place-based approach to

supporting green jobs and sustainable living (of which investment is part) is critical to enabling and ensuring acceptance. In this paper we define a place-based approach as being "about understanding the issues, interconnections and relationships in a place and coordinating action and investment to improve the quality of life for that community" (Our Place 2023). This said while undertaking such developments actors should avoid disvalue to wider society and the environment in actions and investments. Place based approaches that seek to align with particularly strong environmental governance should demonstrate "integrated management of the full suite of human activities occurring in spatially demarcated areas identified through a procedure that takes into account biophysical, socio, economic, and jurisdictional consideration" (Young et al., 2007:22)[1]

1.3 The focus of the current paper

Within the green jobs literature there is currently not a conceptual framework that provides a framework to support opportunities for place-based green employment and sustainable living in cities. There are a range of frameworks out there with a place-based focus, but they do not have a green jobs and city focus, for example Pisters et al (2019) who focus on sustainability more generally, likewise Shrivastava and Kennelly (2013) look at sustainability and place-based enterprise, Reed (2017) present a place-based approach to payments for ecosystem services with a case study of peat lands (directly based in prominent ecosystems), a review of wider green jobs literature that informs this paper and its development can be seen in Bradley et al (2024). In green jobs literature, most papers published are empirical not conceptual. The objectives of this paper are twofold: 1. Present a novel framework for supporting opportunities

[1] Following the approach adopted by Reed et al 2017, the place-based approach has two pillars (Bolton, 1992; Barca et al., 2012): Pillar one pays attention to geographical context, and in particular the spatial, social, cultural and institutional, and biophysical aspects (Selman, 2000). Pillar two has a focus on the knowledge flows as well as interdependencies between social actors having capabilities to secure power and social capital to capture and manage resources in places with an ability to exclude or marginalize others (Cowell and Lennon, 2014).

for place-based green employment and sustainable living in cities; and to 2. Apply the framework alongside literature to aid discussion of research gaps and a research agenda focused on supporting place-based green jobs and sustainable living in cities.

Research questions (RQ):

RQ 1: Can a conceptual framework be developed for supporting place-based opportunities for green employment and sustainable living in cities but with a systems approach?

RQ 2: Applying this framework what do we learn about some of the important research gaps and areas for future research?

RQ 3: What are the benefits shown when applying such a framework alongside literature to inform a research agenda?

2 METHODOLOGICAL

2.1 Approach framework development

A conceptual framework is something constructed (Maxwell 2005), not found, it incorporates pieces that are borrowed from elsewhere, but the structure and overall coherence of the framework, is something that you build. On this basis, as well as pre-existing reviews conducted, development of the framework drew on experiential knowledge (as well as existing theory and literature identified below). The experiential knowledge approach makes use of a scientist's technical knowledge, existing research background and experience to pilot and advance the framework in the required way for what is being pursued (Maxwell 2005).

Maxwell (2005) advises against using purely literature review and summaries of a body of theoretical or empirical literature in developing frameworks as it tends to result in a narrow focus on literature and does not make use of other conceptual resources than can be as, if not more, useful. A purely literature-based approach can also generate an approach of "covering the field" rather than focusing specifically on those theories and studies that are particularly relevant to the research.

The study chose to build on an existing economics framework by Williamson (2000) and Bradley (2021) from institutional economics. We selected the framework from this field due to the strength of institutional economics in conducting inter-disciplinary economic analysis and strong credentials for analysing systemically interconnected issues, elements and relationships relevant to transitioning to sustainable economy and appropriate for place-based research. As part of the development process a systematic review of existing institutional economics frameworks was undertaken Bradley (2022) and a systematic review of the green job's literature was undertaken most recently see Bradley et al (2024).

We build on the Williamson (2000) and Bradley (2021) framework to make relevant to supporting opportunities for green employment and sustainable living. In order to develop the focus on supporting opportunities for green employment and sustainable living, it was realised that the existing framework needed to have a stronger, more nuanced appreciation and connection to capitals and the different forms they take. Therefore, it was advantageous to connect the framework to different forms of capital inputs and outputs that support and impact the general functioning of the economy and that influence and support opportunities for green jobs and sustainable living. This improves the framework's ability to inform on relevant issues,

interconnections, relationships and thinking on supporting opportunities for green jobs and sustainable living (as illustrated in the paper).

2.2 Approach to illustrating and applying the framework with literature and examples

In the paper we apply the framework (illustrating it) in tandem with relevant literature (mainly green jobs literature) and examples to help identify important issues, interconnections, relationships, research gaps and to advance a research agenda for supporting place-based green jobs and sustainable living. This process of application of the framework with literature helps grasp the intricacies and connections between different parts of the system in interaction and 'grounds' discussion (alongside some examples). This then illustrates how different elements can interact to support or hinder opportunities for green employment and sustainable living. This process helps locate synergy, gaps and important interaction and further research and illustrates the benefits and usefulness of applying a framework in tandem with literature to help craft a research agenda (relevant to RQ2 and 3). The stimulated discussions and exploration identify opportunities for cross disciplinary research and relevant collaborations, as well as advantageous types of research underutilised within some disciplines. The process helps indicate future evidence to support opportunities and solutions for place-based green employment and sustainable living.

3. RESULTS AND DISCUSSION

3.1 Resulting framework

Our novel systems-based conceptual framework to focus and structure this research integrates, augments and operationalises an institutional economics (Williamson, 2000; Bradley, 2021) and the 'five capitals' approach (Porritt, 2007; Ekins, 1992, 2008). It is displayed in Figure 1. This

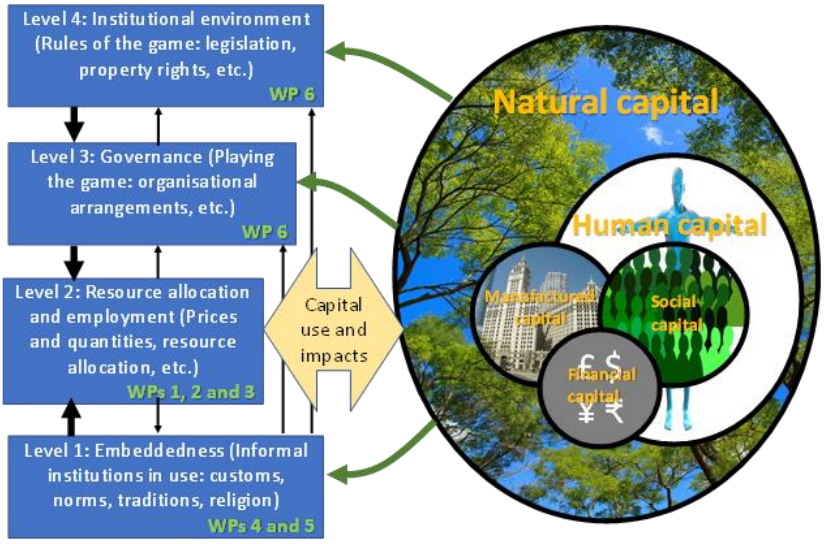
helps structure and organise inquiry for place-based research addressing sustainable investment, green jobs and sustainable living, and helps generate new research questions, and initiate a research agenda. The framework sees institutions as constraints, solutions, cognitive models, or normative structures (Dequech, 2002). Level 2 (L2) relates to resource allocation and employment outcomes (section 3.2, 3.3 and 3.4) and with different capital use (inputs) and impacts (outputs). L1 Embeddedness (section 3.5 and 3.6), L3 Governance and L4 Institutional Environment (section 3.7) act as constraints or enablers of certain forms of investment, consumption, production and jobs and have real outcomes on sustainable living and its emergence and diffusion. Feedback between these vertical levels are seen in Figure 1 (provided at the end of this document).

The conceptual model introduced in this study includes a broader framing of capitals, conceptualised cyclically in Figure 1 as a version of the 'five capitals' approach, (Porritt 2007) recognising inputs and outputs affecting all capitals in an integrated manner. Natural capital, principally biodiversity and ecosystem services, is the primary capital upon which the other four capitals depend, represented in the overlapping capitals to the right of Figure 1. All of the capitals are dependent upon natural capital. Social capital are the features of social organisation[2]. This includes networks of relationships and trust that shape and influence shared belief and knowledge systems (and 'we-intention' as seen in Ishihara and Pascual 2009), traditions and exchange, and ultimately the formal and informal institutions that exist and their influence on collective as well as individual action. Social capital is dependent upon and formed by shared knowledge, beliefs and skills within human capital. Manufactured capital overlaps with human, social and natural capital as manufactured infrastructure is made from and draws energy from natural systems,

[2] Social capital defined here as the 'features of social organization such as networks, norms and trust that facilitate coordination and co-operation for mutual benefit' (Putnam, 1993, pp. 35–36).

though is devised by people (human) working together with institutions (and resulting social capitals). Financial capital is a key starting point in providing the investment required to start the production process. Financial capital is further produced in the overlapping area of natural, human, social and manufactured capital as people work together with the aid of manufactured infrastructure to convert natural resources into economic products and services that realise jobs, financial returns and concurrently serve primarily human needs and wants.

Figure 1: A framework for analysing place-based resource allocation, green jobs and sustainable living



3.2 Applying the framework to inform a research agenda for supporting opportunities for place-based green employment and sustainable living

In this section of the paper, we discuss six themes for research which relate to the framework and literature. This starts a process of setting out some clear gaps, questions and a research agenda

for place-based green jobs and sustainable living. We start with financial capital as this is a pre-requisite to support the development of green jobs.

Place based finance and projects for deliver environmental goals and green jobs

The main conundrum academic, public sectors and policy-makers need to address at national and local levels in the context of climate finance is how to mobilise private capital to achieve NetZero, exacerbated by government debt and high cost of living (Committee on Climate Change [CCC], 2019a; Green Finance Institute, 2022). While Clark et al. (2018), Druce et al. (2016), Robins and McDaniels (2016), Polzin et al, (2019) have conducted some work on investment barriers, IRENA (2015), Weissbein et al. (2013), Bielenberg et al. (2016), Gordon (2023) and Climate Finance Aggregation initiative (2014) suggest that risk mitigation, policy incentives, blended finance, project aggregation and co-investment models are important issues to unlock the flow of private investment in green projects. There are knowledge gaps in understanding of optimal financial mechanisms, scalability, and transferability of place-based financing solutions for green projects. Robins *et al.* (2019) emphasize the importance of 'just transition' to NetZero. We also know from the literature (Popescu *et al.,* 2021) and previous sustainable finance workshops that challenges exist in developing good metrics and approaches for project evaluation. Only by doing so can we ensure best investments and projects are selected that lead to the multiple objectives and co-benefit for stakeholders that do not generate substantial disvalue for society or the environment via changes in other capitals balances (Bradley et al 2021). For example, a project or business that liquidates certain forms of natural capital (such as reducing biodiversity of a forest) and/or infringes human rights, financial capital may increase but certain forms of natural and human capital can decline, and in some cases irreversibly, potentially generate repercussions elsewhere

in the system or at other levels[3]. The types of questions and research agenda that this leads to in relation to ensuring financial capital to meet environmental targets, delivering improvements in natural capital and green jobs are:

- What financial mechanisms overcome barriers to investment, leveraging public capital to mobilise private investment in climate mitigation projects (and other environmental goals) in cities?
- What are the necessary characteristics for their success and transferability?
- What are the potential challenges in using private finance for these projects?
- What approaches and metrics enable best evaluation of project investment decisions and just transition?
- How best do we involve the range of relevant stakeholders such as different city communities in decisions to achieve positive impacts on financial, environmental and other forms of capital from different projects that impact them and avoid marginalisation or exclusion?

Human capital: green jobs and living well, equality and diversity: The majority of green jobs literature examines macro-economic impacts on jobs creation for transitions to NetZero or green economy at national and/or international level. Limited studies investigate the relationship between green jobs, job satisfaction and/or quality-of-life, few look across sectors, and none with detailed regional- or city-level place-based focus (DeHart-Davies et al. 2014, Iranmanesh et al.

[3] In such circumstances there can be repercussions in other parts of the system, for example, if this behaviour is revealed, trust in such firms operations and investments will be eroded (social capital), which can have feedbacks for the willingness of investors to support such investments or business (financial capital) and of citizens to perceive such investments or services as not good (changes in embeddedness at Level 1 filtering through to changes in investment at Level 2 with financial implications for firms).

2017, Bohlmann et al. 2018, Pinzone 2019, Kim et al. 2019, Zhao et al. 2020, Chen et al. 2020). There is a need to develop detailed regional approaches to explore cities and their key sectors. Substantial knowledge gaps surround likely future changes in green jobs and skills from current and future investment, raising research questions such as:

- What are the qualities of different types of green jobs that a city region should be looking to attract and why?
- How do these jobs 'play to' the strengths of the city-region?
- What are the different qualities and skills required of green jobs?
- What aspects of equality and diversity are present in relation to green jobs of these sectors and how can this be improved equitably to ensure a just transition?
- How are green jobs and skills likely to change in future for these sectors?

In areas of new careers, sometimes it is important to signpost the new opportunities and good prospects that green jobs can provide and that are different to existing historic industry roles. Therefore, changing the culture on the ground of what is seen as a good 'steady job' is likely to be important as some industries transition and new jobs emerge in relation to the green economy. This essentially will require developing the evidence base and social capital surrounding green jobs, so that people have confidence and self-efficacy in moving forwards. There is a role for educators and others to keep up to date with the changing jobs markets and socially embed this into cultures at universities and other institutions that train and advise on changing career prospects as they emerge with changing technologies and the green economy. There has been very limited research on this topic in the green jobs' literature, but it is hugely important.

Resource allocation and employment: the role of detailed regional analysis of the impact of green industrial/jobs strategy on capitals: Few detailed regional or city analyses of green jobs exist as identified above and none assess wider impacts on natural capital (beyond carbon impacts). Yet there are important questions for cities to address strategically, such as how do changes in place-based investment, jobs and industrial strategy impact the quantities and qualities of green (and other) jobs and output, natural capital and CO_2. There is a need for detailed regional economic analysis such as via input-output (based on Leontief, 1936) and other modelling approaches to be developed for cities to address place-based questions in relation to green jobs. The models need to identify connections to other regions, using detailed multi-regional modelling approaches to provide detailed output, employment multipliers with markers for green jobs (and their associated qualities). Green jobs markers can signal the quality and quantity of green jobs by sector. Vectors of greenhouse gases (GHGs), material flows and Natural Capital intensity (and other environmental) coefficients can be developed and integrated to assess economy-wide impacts from cities (spillover effects). Scenario analysis will also be needed in conjunction with I-O (or other relevant models) to explore changes in strategy/technology, business models (part of governance) and economy-wide impacts, for examples see Dewick *et al.*, 2006. In particular, policy makers and industry leaders can look at different investment strategies for cities by sector to understand their economy wide impact on natural, human and financial capital, GHGs and other environmental targets (as well as those specific to the place). Ideally, investment and green jobs strategy should be developed alongside understanding the strategic advantages from investment in those sectors in relation to (historic strengths) green jobs (human capital) and the likely qualities of those jobs and benefits they can bring. Equally important is to understand how divestment, or transitions in existing industries towards environmentally sustainability, may adversely impact place-based human capital, and exactly who are the stakeholders negatively impacted, e.g. which job types and

how many jobs etc within a city or place? There has been much national and international research on such topics but less city-based or local place-based research (in relation to green jobs), yet to address these challenges there is a need to understand exactly who and where is impacted and engage from there, this can help redirect retraining needs and support by geographic space and time. The latter types of analysis and support are important as if the transition is not orderly this can negatively impact social capital towards the green transition and green jobs.

Socially embedded markets and linkages between green jobs, sustainable living

There are important areas to research in relation to green jobs and social embeddedness. For example, there are limited empirical green jobs studies that study how changes in city investment, resource allocation and employment (L2), interact with social narrative and social embeddedness (L1) to impact social capital for green jobs and a green transition. This interaction of investment, policy, resource allocation and social embeddedness is an important area for more research. Recent evidence of examples of negative sentiment towards green investments and transitions from investments include the reaction to the expansion of the Ultra Low Emissions Zone (ULEZ) in 2023 by some sections of society in London. See also negative sentiment from recent changes at Port Talbot changes were said to be needed due to the move towards greener steel making (Guardian 2024). This can become politicised and can alter the social (and political) embeddedness, social capital and support for such green investments and a green transition (see BBC 2023).

How to socially embed markets for sustainable products and services in cities is a second major gap (Dasgupta, 2021) that is key to the development of green jobs, but barely discussed in

empirical studies in the green job's literature. Through green jobs and sustainable finance workshops run in 2023, it was found that in UK city regions such Bristol, there is a lack of demand for retrofitting houses with heat pumps (and other upgrades) that are essential to meeting climate change targets. Additionally regional bodies such as the West of England Combined Authority provide free green skills support to firms on retrofitting but have found slow uptake; interlinked with this issue is the lack of demand to invest by households to retrofit existing housing. This 'chicken and egg' issue between demand and supply is not uncommon for businesses wanting to develop new sustainable products and services (Ceschin 2013), yet it has received relatively little research attention in the literature compared to other subjects. Ceschin (2013) identify a need for social embedding in such contexts. The framework in Figure 1, shows conceptually and theoretically the strong linkages and feedback between social embeddedness and resource allocation and employment. Increasingly the need to meet NetZero will require changes in cultures in both demand and supply alongside change in the institutional environment (incentives/regulation etc.) in order to foster viable markets. As such, this is an essential area of research in relation to new products and product service systems that has thus far been relatively neglected. Its importance is evidenced by Ceschin (2013), in recent workshops mentioned and shown conceptually in the framework (Figure 1). In the case of retrofitting, this leads to research questions such as what approaches are required to socially embed demand and supply to enable stronger markets for retrofitting in cities? The latter issue is also pertinent to advanced services for circular economy. Advanced services can be highly economic and generate substantial financial capital, deliver high amounts of place based green jobs in regions where consumption takes place (human capital) and can dramatically reduce and slow material flows (improving natural capital), see Stahel et al (2013). However, the socially embedded norms of consumption of 'ownership of products' in western countries can create barriers to demand,

these aspects are under researched (Boons and Ludeke-Freund 2013). Negative culture and behaviour of consumers in cities towards such sustainable service-based solutions can is also seen in Bristol Post 2022).[4] Advanced services approaches, when working well, can be the most beneficial approaches in terms of improving the natural capital, financial capital and human capitals balances, and have demonstrable place-based impact on green jobs.

A third aspect little researched is the impact of green jobs (generated and L2) on employees' pro-environmental behaviour at home or in the city community (socially embedding pro-environmental behaviour at home), and relevant pathways (Verfuerth and Gregory-Smith, 2018). Potential for this feedback is identified in Figure 1. There has been much more research on the cross contextual spillover effects from the home to work (but not the other way round). So specifically, there is a need for more research on these other pathways, particularly with the proliferation of green jobs – what is the impact on pro-environmental behaviour in the home and city community?

Job roles, mindset and reducing natural capital impacts of brown sectors

Socially embedding of pro-environmental employee behaviour to a good degree can occur in the workplace (alongside existing pro-environmental values etc). This said, attitudes, beliefs and action regarding job role and influence on the environment vary substantially, including within green sectors let alone their 'brown' counterparts (see Herbert *et al.,*2022). Pro-environmental employee studies are predominantly quantitative, using statistical analysis, see Aziz et al 2018

[4] New Institutional Economics provides strong intellectual resource and theory to analyse such governance challenges and how to get transaction costs down; encouraging shifts in culture can be one solution in some contexts.

(page 227) and Zaidi and Azmi 2022 (p.177). Most studies reviewed focus on employees' own waste avoidance, recycling, or own energy conservation, not the potential of job roles to reduce environmental impact, and upstream and downstream related emissions. Additionally, existing pro-environmental employee studies largely ignore the role of modes of thinking, feeling and action (Aziz et al 2018 and Linder et al 2022). While few studies evidence the diversity and prevalence of worker perceptions of their job roles and influence on environmental impacts related to up-stream or use-phase impacts of the products and services they produce (overall human capital impact associated with roles, rather than specific employee pro-environmental behaviours). These factors suggest the following research questions should be considered:

- What are the diversity and generality of different modes of thinking, feeling and action regarding workers perceptions of their roles?
- What influence does this have on environmental impact within different job types and different sectors?
- What messages motivate different types of workers with different values?
- Which interventions best motivate workers and improve mindset towards job roles and reduce environmental impact?

There is a need for 'mindset typologies' for different roles in key sectors, categorising the diversity of modes of thinking feeling and action regarding job roles and impact on the environment. We also need archetypes of leading pro-environmental employee mindset and behaviours within roles'. Without this the advancement of green jobs, literature is hampered. So, this type of analysis of the social embeddedness of green jobs should also be a key priority for advancing understanding on supporting opportunities for place-based green jobs and sustainable living.

Governance and institutional environment for investment for green jobs and sustainable living in cities: At city scale there is a need to addresses transformation of governance arrangements. Attention should be given to developing the necessary formal institutional environment at local and national levels needed to reshape decision-making and ensure a strong selection environment (See discussions in Bradley 2021) for private and public investment contributing to green jobs and sustainable living. There is a diversity of examples of how local governments already use diverse tools and networked approaches to plan, govern, and leverage public investment for NetZero transformation. Local and unitary city authorities have central roles in spurring new ways of working to create bankable packages of integrated interventions realising multiple co-benefits at local level (3Ci, 2022; 3Ci, 2023b), creating novel opportunities for applying decision-making tools and frameworks for cross-sector engagement with climate action, investment planning, and co-creating new aligned governance processes (3Ci, 2023a; NZC, 2022). Yet there is a need to appraise which current tools and frameworks are fit-for-purpose and what else is required for local NetZero transformation. There is also a need to look at the range of policies and governance approaches that Councils and cities are using to address key environmental challenges and alignment of local and national policy and governance, building on the work of Net Zero Cities (NZC) and the Place Based Climate Action Network, amongst others. Policy and governance at local level (interacting with national policy) can substantially encourage inward investment for environment-related projects and business (see example in Bradley et al 2020) but it needs to be done in a careful way. It is clear that in cities such as Bristol (City Leap being an example) that strong leadership by local government can help attract the financial investment required for projects that improve the natural capital balance and lead to co-benefits in a way that reduces the extent of finance required by the public sector (Nolden et al 2024). Such investments can therefore impact financial, natural, social, human and manufactured capitals all at the same time, but careful governance is required

to ensure success for the range of stakeholders and a systems approach to the challenges and wicked problems being addressed. The framework in tandem with literature and examples helps recognise this with a place-based but also systems approach.

4. CONCLUSIONS

The paper was able to advance a conceptual framework to help support place-based green jobs and sustainable living that is highly applicable to cities. To do this, the paper integrated the five capitals concept into an existing framework that marries interactive understanding of social embeddedness, resource allocation and employment, governance and wider institutional environment. The paper applied the conceptual framework in tandem with literature to highlight key gaps and a research agenda for supporting place-based green jobs and sustainable living. As such the role and interaction of diverse factors that can combine in city and their capacity and potential to influence support and strategy for green jobs and sustainable living are discussed. In this way the paper makes a useful and novel contribution, as much of the green jobs literature is focused on national or international macro level analysis, and much less on advancing detailed regional place-based or city approaches and there was a lack of place-based conceptual frameworks relevant to the focus of the paper. All implementation is local, so there is a need for frameworks that can be applied and inform in this way. A framework with a systems approach, focused on the interacting elements that influence the support of opportunities for place-based green jobs and sustainable living, as yet not been published yet is needed to inform strategy and approaches to advance green jobs and sustainable living in cities.

The paper presents the framework and applies to help understanding the issues, interconnections and relationships and useful insights for research that may need investigating in future to support

place-based green jobs and sustainable living. The benefit of applying the framework with literature and examples is that it demonstrates the framework in action but also highlights synergy between different parts of system and research avenues that are missing in the literature become clear. This then helps align a research agenda (and questions) that is focused, interactive and relevant for place-based and city relevant research. As part of this first attempt at a research agenda, the key themes (and questions) for future research were as follows:

Place-based sustainable finance to ensure green jobs and sustainable living

Optimum place based sustainable finance is critical to enable green jobs and sustainable living, delivering the transition locally is the most effective way of achieving NetZero (PCAN, 2023), but it requires substantial place-based investment in cities much of which will need to come from the private sector in the case of countries like the UK. Many green jobs and sustainable living simply will not materialise without the investment. Key research gaps and research questions that need addressing can be summarised as follows:

- What financial mechanisms overcome barriers to place-based city investment, leveraging public capital to mobilise private investment in climate mitigation and other environmental projects and lead to green jobs and sustainable living?
- If private finance is used, how do we best crowd in the values of community and other stakeholders and ensure that such investments perform well and deliver the benefits for the range of stakeholders/community/minorities and at the same time optimise the capitals balance from investments?

Human capital inputs and impacts and how they change through time

Human capital inputs and outputs from investment are critical. Key questions that emerge are:

- What is the relationship between green jobs, job satisfaction and/or quality-of-life and diversity?
- What types of jobs should cities be trying to attract and why and how do certain green jobs 'play to' the strengths of a city?

This leads to additional questions such as:

- What metrics should be used to evaluate green jobs?
- What new and future investment, and skills are required?
- What are the implications of change on human capital benefits?
- With structural change and displacement, what is required to transition and ensure human capital and that the quality of green jobs does not deteriorate?

The latter could potentially include implications for the wider institutional environment (e.g. laws etc) and social provisions.

Resource allocation and employment: the role of detailed regional analysis of the impact of green industrial/jobs strategy

Key questions that arise in relation regional analysis of green strategies include:

- How do different city leve investment strategies have economy wide impact on human and natural and financial capitals and the strategic advantages?
- What are the economy wide changes occurring for capitals from different strategies and resource allocation, what is the impact on place and surrounding areas and how may this impact sustainable living?

Additional key place-based questions arise, such as:

- Which strategies play to the strengths of local areas and their capabilities?
- What are the sector inequalities and outcomes for local areas, and overall benefit or losses by sector?
- How are local sectors likely to change over time in terms of structure and technology and capital impact: financial; human; natural capital?

Much has been researched on net jobs creation at the national and international level but few models and papers investigate green jobs with a detailed place-based city level approach, even though this is where much of the action, agency and change occurs, although also occurring from further afield some times.

Right oil? Social embedding for green jobs and sustainable living and cross contextual spill over

We need to understand interaction of investment decisions (including policy investments) interact with social embeddedness of cities. For example one may question how might bad investment decisions, or investment decisions that are seen to overall be good but generate significant disvalue for certain segments generate negative sentiment and adversely impact social capital for green jobs/economy? While also considering how such decisions potentially interact with political embeddedness to lead to sub optimal progress/regression from green economy/green jobs.

The interaction of investment, policy, resource allocation and social embeddedness is an important research area for place-based transitions to green jobs. The importance of social networks in the transfer of green jobs and sustainable living is also important. Very little research investigates this cross contextual spillover effects that green jobs in the workplace have on

employees' pro-environmental behaviour at home and community. Equally, there is limited research on how to best socially embed new sustainable products and services in situations where city demand and supply are weak, such as in retrofitting homes in the Bristol, even though the move to these products and services is key to meeting environmental targets, this challenge is also often highly relevant to the most pro-environmental advanced services circular economy solutions.

Green jobs archetypes and human capital consideration in pro-environmental employee behaviour of city workers

Pro-environmental employee studies are predominantly quantitative, using statistical analysis. Most studies reviewed focus on employees' own waste avoidance, recycling, or own energy conservation, not the potential of job roles to reduce environmental impact, and of upstream and downstream related emissions. Existing pro-environmental employee studies largely ignore the role of modes of thinking, feeling and action (such as the role of habit and emotion). Individual pro-environmental employee behaviours dominate, but what about overall job roles of those working for city based organisations, what is the potential for human capital contributions in this context? Diversity and prevalence of worker perceptions of their job roles and influence on environmental impacts related to up-stream or use-phase impacts of the products and services are under researched. These factors suggest the following research questions:

- What are the diversity and generality of different modes of thinking, feeling and action regarding city worker workers perceptions of their roles?
- What influence does this have on environmental impact within different job types and different sectors?

There is a need for 'mindset typologies' for different roles and sectors, categorising the diversity and prevalence of different modes of thinking feeling and action regarding job roles and the environment. What archetypes of leading pro-environmental employee mindset and behaviours within roles exist? In this way we can see more holistically the impact that different forms of human capital can have pro-environmental behaviour. This can move us towards an improved understanding of the of different forms of human capital in improving natural capital balances.

Creating a selection environment for investment, green jobs and sustainable living

The last section of the paper shows the need to explore and assess different governance approaches and tools and improve governance and the institutional environment (laws and policy etc) to aid and appraisal of infrastructure and strategic investments for place-based green jobs and sustainable living, there is a range of work going on in this area, and there is a level of trial and error in understanding what works best, learning will inevitably take place as new approaches, tools are trialled in practice, but there is a key role for researchers to engage with investigation and analysis in collaboration with policy makers and other to inform and undertake the research and assessment. Much of the analysis here will not have access to large datasets typically applied by economists and finance experts, but instead will make use of smaller samples, primary data collection and mixed methods implemented in cities. Most economists and finance experts do not apply such methods so there is a need for upskilling and enlightenment here.

Implications for practitioners

Businesses should engage with city and national policy makers to help them understand their needs, for example, what is the investment in the infrastructure, training, and interventions needed to encourage sustainable demand and supply of sustainable products and services. If

businesses are to increase investment, they need a supportive institutional environment for sustainable products and services, as for many sustainable products and services the wider environment and context matters in terms of there being a culture and selection environment to enable adequate demand and supply for key services and products required to meet environmental targets (See Bradley et al 2021). It is also important for businesses to understand the interaction of business strategy and its future change with the wider social embedded culture of consumption and production and business environment, the framework can be applied to help with this. Businesses and trade bodies should also be encouraged to work with local governments to help nurture an industrial and green jobs strategy that can help realise the most sustainable products and services and business models and a systems approach for embedding place-based green jobs and sustainable living (the latter is also relevant to policy makers). This could do a lot to also minimise susceptibility to disruptions to supply and enable a strategic move to place-based advanced services in cities and at the same time deliver substantial place-based economic, green jobs and environmental benefits.

The framework can be used to help policy makers think through potential for positive or adverse system interactions for city investments and different strategy, social embedding and governance approaches required to help ensure success and avoid negative outcomes for business in delivering green jobs and sustainable living. The paper prompts considerations in developing best city green industrial and jobs strategy. The paper highlighted the need to use tools to engage relevant stakeholders on investments to gain perspective, incorporation of values and approaches for a positive interaction within the wider system and to look for investment and jobs strategies that generate high human capital benefits locally, but also improve capitals balance and sustainable living in the wider system. This is the strength of the framework taking a systems approach.

The framework although applied with literature, can be applied individually but most effectively jointly, by city practitioners, policy makers, academics and civil society to help investigate and plan best systems strategy and approach to support place-based green jobs and sustainable living and co-produce solutions and evidence. The framework when applied here with examples highlights the need to pay particular attention to distributional outcomes from investments and potential for interaction with wider social system such social embeddedness or institutional environment that helps or hinders city investment. For example, differentiated impacts of investments on different groups can interact with social and political embeddedness and impact social capital for a transition to green jobs. Likewise, interventions may be required to encourage social embedding on new sustainable products and services that otherwise will not materialise (and impact green jobs), retrofitting houses in Bristol (and other cities) being an example in this paper.

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