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Unravelling net zero practices, strategies and barriers among businesses in a UK region

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Abstract: This paper investigates how far business organisations are moving towards net zero goals. Using a qualitative methodology consisting of 18 semi-structured interviews with senior managers of businesses in a region in the UK, this research looked at the shared experiences in terms of the practices, strategies and barriers that they face. Technological transformation and management practices improvement were identified as commonly used strategies among businesses. Whereas limited supporting infrastructure, guidance from government and funding posed significant barriers to transitioning towards net zero. This paper classified the participating businesses according to Berger-Schmitz et al.'s (2023) framework, where most organisations followed an 'opportunity-seeking' response, with the exception of the agricultural sector, which followed a 'conformance' response, interestingly no 'avoidance' response organisations were found. Recommendations for businesses as well as future research avenues are provided.

Keywords: net zero strategies; technological transformation; management practices improvement; qualitative methodology; UK.

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1 Introduction

The pursuit of net zero (NZ) emissions has become an imperative for businesses worldwide. net zero emissions represent a crucial balance between the amount of greenhouse gases released into the atmosphere and the amount removed or offset, effectively putting a stop to the rise in atmospheric concentrations of these gases (Oxford Net Zero, 2022). As the impacts of climate change become increasingly severe, with rising temperatures, more frequent extreme weather events, and ecosystem disruptions, businesses play a pivotal role in the mitigation and adaptation to the effects of climate change.

Thus, a significant and rapid acceleration of efforts is imperative across all sectors to meet the 2030 goals. We must transition from the usual incremental approach to emergency mode to achieve this necessary speed. This involves significantly increasing the growth of solar and wind power, expediting the phasing out of coal in electricity

generation, reducing deforestation at a much faster rate, and substantially increasing global climate finance by nearly US\$500 billion annually throughout the remainder of the decade. The urgency calls for a transformative shift in our approach to address these challenges collectively and urgently (Boehm et al., 2023), this could involve reduction in energy consumption as well as products/services demand both from individuals and businesses. It must be highlighted that mitigating climate change will also reduce the loss of biodiversity, lower the risk of irreversible ecosystem loss and degradation, create a wide range of benefits to sustainable development, such as improved air quality, increased access to clean energy, diversified livelihoods, and enhanced food security (IPCC, 2022).

Reducing CO₂ emissions and achieving net zero from the industrial sector is challenging. It will involve a coordinated action throughout value chains to promote all mitigation options, including demand management, energy and materials efficiency, circular material flows (which minimise extracting virgin materials for making new products), as well as abatement technologies and transformational changes in production processes. Progressing towards net zero GHG emissions from industry will be enabled by the adoption of new production processes using low- and zero-GHG electricity, hydrogen, fuels, and carbon management (IPCC, 2022).

This research takes stock on the state of the businesses progress towards net zero in a UK region, and how far they are involved towards achieving this. In doing so, we also look at the strategies businesses employ and the barriers they encounter in that journey. The theoretical challenge is to provide a framework that businesses could use to understand their current position and make better progress with their plans for the future. Practically, we as a society need to make significant progress towards mitigation, adaptation and regeneration due to climate change.

This paper utilises semi-structured interviews to examine how UK businesses are responding to the challenges of climate change as they strive to achieve net zero emissions. Our paper sheds light on their practices and strategies while also discussing the ongoing barriers encountered.

Thus, the research question addressed in this paper is: *What are the shared experiences faced by businesses in a UK region to move towards net zero?*

2 Literature review

This section provides an overview of the state of the art in relation to: UK transition to net zero, net zero in value chains, and theoretical lenses adopted.

2.1 UK transition towards net zero

The UK Government (2021) has committed to reducing carbon emissions by 68% compared to 1990 levels by 2030, and is the only major economy to have set a reduction target of 77% for 2035. Although the UK Government has recently announced a revised plan, delaying some of the measures initially set for 2030 to 2035 (e.g., move back the ban on the sale of new petrol and diesel cars by five years), according to the UK Government (2023), this does not impact on its ambition to be world leader in the climate arena, as the country has so far over-delivered in comparison to other G7 economies.

At regional level, for example, York and North Yorkshire have defined a routemap to carbon negative, setting the region's ambitious plans to be net zero carbon by 2034 and carbon negative by 2040 (LEP, 2023). The routemap was adopted by the Local Enterprise Partnership (LEP) Board in 2022, and a parallel process of endorsement or adoption amongst local authorities is now underway. The plan considers sectoral emissions for transport, buildings, power, industry, and land use and agriculture (Durusut et al., 2021) and went through a consultation process and roundtable discussions designed to challenge and validate the carbon abatement pathways defined by the plan (LEP, 2023).

2.2 *Net zero in supply chains*

Net zero adoption has been studied more intensively in recent years. For example, Xu et al. (2023b) present a study in China with three scenarios: high, medium and low economic growth. These are forecasted based on energy consumption to create positive, baseline and negative low-carbon optimisation of energy consumption structure. Twenty-seven scenarios are generated and analysed. They suggest that continuing the increase of renewable energy development and consumption is most important for China to achieve its net zero goals.

Rodriguez Mendez et al. (2024) assess the greenhouse gas removal (GGR) technologies in relation to UK net zero scenarios used in UK climate policy making. Their findings focus on the use of such models in relation to handling their uncertainties that distort the net zero policy design and decision making. They propose both a top-down and a bottom-up approach to modelling scenarios for policy makers, which takes into account: individual targets and policy options; interaction of trade-offs among sectors, feedback on system feasibility; as well as aggregated national target, break-down at sectoral and local individual interventions.

Xu et al. (2023a) studied G20 countries in relation to pursuing green technological innovations and environmental regulations, which they propose as the most effective ways in achieving net zero targets. They used entropy weights to come up with two indices for each of these ways and benchmark their performance across the sample. They conclude that both technological innovations and environmental regulations should be encouraged by governments to achieve net zero goals.

Mazumdar et al. (2023) show how different local authorities in the UK are responding to the net zero targets, with regards to their challenges and barriers. They mention that socio-technical imaginaries (Jasanoff and Kim, 2013) have been used to help local authorities forecast the potential scenarios that could happen in future. This is because imaginaries can help ease the stakeholders role in terms of knowledge flows (Pollard, 2019).

Among evolving options and pathways for industrial decarbonisation are new production methods that can fundamentally change cost structures for industrial production, and with it the most cost-effective geographic location for facilities, including their whole supply chain (SC). For instance, for currently emissions-intensive products (e.g., steel, cement, and chemicals), their SCs could increasingly be separated into components, located respectively at optimal locations. Thus, the most emissions intensive parts could be in regions with adequate carbon capture and storage (CCS) geology or relatively inexpensive renewable electricity. The intermediate product would then be shipped for the next stage of processing (Bataille et al., 2021).

Inefficiencies in the SC processes, such as: sourcing, storage, manufacturing, transportation, warehousing and waste management cause significant GHG emissions. Sustainable Europe Research Institute (SERI) reported that 21 billion of the raw material used in production does not become a part of the final product (Mishra et al., 2023).

Berger-Schmitz et al. (2023) propose a framework for classifying net zero target responses by corporations. Their study was based on 30 interviews with managers from organisations in different sectors, and theorise that organisations respond in relation to their competitive and institutional pressures from the environment. Inspired by institutional theory, they propose that there are three types of response: ‘avoidance’, ‘conformance’ and ‘opportunity seeking’ in relation to decarbonisation targets. They also posit that these responses would vary over time. In this paper we use Berger-Schmitz et al.’s (2023) framework on dynamic positioning behaviour.

2.3 *Contingent resource-based view*

Many authors have applied contingency theory to their research. For example, Adetoyinbo et al. (2023) studied globalised agri-food smallholders and the network structures in which smallholders embed in a quantitative manner.

In their seminal paper, Sousa and Voss (2008) stated that the use of contingency theory in operations management is concerned with: identifying contingency variables (external to the organisation), categorising contexts according to those, and establishing internal design or responses in each category (managerial actions) which could prove to be more effective (performance measures). Typical contingency variables would be: national context and culture, firm size, strategic context, and other organisational context variables. In this paper, we consider the contingency and response variables as well as their overall effects on performance, i.e., CO₂ emissions.

Contingency theory has been combined with the resource-based view into contingent resource-based view (CRBV) and this combination has proven popular in the study of SC resilience (Chowdhury et al., 2019). For example, Parast (2022) articulates how CRBV benefits SC resilience research, which includes an insight into the potential side effect of addressing SC resilience from CRBV lens – it could increase operational pressures and thus hinders SC performance. Such a finding raises the question that to what extent will managers react to contingent factors in operation. Most articles examine how practices under CRBV guidance help enhance SC performance, but what about SC establishment upon which performance is then allowed. The meaning of discussing contingencies is associated with the fact that same practices of different organisations could lead to different outcomes.

More recently, Gaudenzi et al. (2023) discloses how different Italian SMEs and big-scale companies maintain their SC resilience by responding to contingent factors. Most of the recent adoptions of contingent based view contribute to SC resilience research. Furthermore, Parast (2022) articulates how CRBV benefits SC resilience research, which includes an insight into the potential side effect of addressing SC resilience from CRBV lens – it could increase operational pressures and thus hinders SC performance. Such a finding raises the question that to what extent will managers react to contingent factors in operation. Most articles examine how practices under CRBV guidance help enhance SC performance, but what about SC establishment upon which

performance is then allowed. The meaning of discussing contingencies is associated with the fact that same practices of different organisations could lead to different outcomes.

In terms of sustainability, Dubey et al. (2020) drew on CRBV and the data from manufacturing organisations in India, this article studies how SC visibility affects the relationship between product complexity – this is seen as contingency – and SC sustainability.

This paper uses CRBV as a theoretical lens, which allows us to see how organisations' practices are in alignment with the context they operate in and how they compare among themselves in their journey towards net zero.

3 Methodology

In this research, qualitative primary data collection was carried out in the form of semi-structured interviews. This was deemed necessary as the issue of net zero is relatively nascent, undefined apriori and evolving. This type of research methodology has been advocated to be used in such situations (Eisenhardt, 1989, 2021; Ketokivi and Choi, 2014).

3.1 Sampling

This research used a qualitative methodology consisting of 18 semi-structured interviews with senior managers of businesses in a region in the UK. This research used a qualitative approach to explore the experiences of business organisations owners in a region in the UK to understand the organisation's progress towards net zero targets set by the UK government.

This research used a theoretical sampling method where organisations were businesses, based in the same region, from sectors of interest to decision makers, which could provide rich data to answer the research question.

We selected participants based on their accessibility and availability. The regional council provided contacts of business which they believed could provide better insights to the research. The research team contacted these business organisations by email and invited them to participate in our research. It was difficult to obtain a response from all firms. This led to a final sample of 18 participants. Those who accepted to participate were sent a questionnaire prior to the interview. The targeted participants were headquarters registered within the region.

The participants were senior decision makers (e.g., chief executive office, manager, etc.). The interview participants represented diverse sectors including manufacturing ... which provided a wide range of perspectives. Table 1 summarises key details of interviews conducted, including the firm identifier, number of employees, duration of interview, industry type, and position of the interview within the firm. It can be seen, based on the number of employees, that the sample comprises four large organisations, nine SMEs, and five micro organisations.

Table 1 List of interviewed companies

Company	Sector	Sub-sector	No. employees (size)	Date interview	Duration	Interviewee position	Mode
A	Visitor economy/hospitality	Retail	100 (SME)	10.06.22	45 min.	Managing Director	Zoom
B	Visitor economy/hospitality	Museum	5 (micro)	13.06.22	25 min.	Chairman	Zoom
C	Manufacturing	Advanced manufacturing	135 (SME)	17.06.22	45 min.	Commercial Director	Zoom
D	Manufacturing	Engineering	1,500 (large)	08.07.22	45 min.	Sust. Manager	Zoom
E	Manufacturing	Energy	2,000 (large)	29.06.22	40 min.	Drax Group, Senior Government Policy Manager	Zoom
F	Food production	Food production	1,400 (large)	12.07.22	50 min.	Innovation Manager Sustainability Manager	Zoom
G	Manufacturing	Engineering	140 (SME)	25.07.22	40 min.	QSHE Manager	Zoom
H	Visitor economy/hospitality	Hotel	135 (SME)	07.07.22	40 min.	Chief Executive	Zoom
I	Visitor economy/hospitality	Accommodation	654 (large)	08.07.22	40 min.	Compliance and Procurement Director MWIFM	Zoom
J	Visitor economy/hospitality and agriculture	Estates	200 (SME)	02.08.22	40 min.	Estate Chief Executive	Zoom
K	Visitor economy/hospitality	Outdoor education	40 (SME)	15.08.22	35 min.	Head of Centre	Zoom
L	Visitor economy/hospitality	theatre	164 (SME)	12.07.22	30 min.	Interim Chief Executive	Zoom
M	Visitor economy/hospitality	Retail	10 (SME)	14.07.22	40 min.	CEO and Founder	Zoom
N	Agriculture/rental	Farming	4 (micro)	09/08/2022	45 min.	Director	In person
O	Digital and creative industries, e.g., screen industries	Media	5 (micro)	15.07.22	45 min.	Business Development Director	Zoom
P	Agriculture	Farming	3 (micro)	20/07/2022	30 min.	Business Owner	Zoom
Q	Agriculture	Farming	1 (micro)	26/07/2022	30 min.	Business Owner	In person
R	Digital and creative industries	Cinemas	18 (SME)	03/08/2022	30 min.	Cinema Experience Manager	In person

The regional council representatives provided the following key sectors they were interested in:

- digital and creative industries, e.g., screen industries
- manufacturing – sub divided into advanced manufacturing/engineering and food manufacturing
- visitor economy/hospitality – which would include retail, catering and accommodation
- food production – mainly concerning agriculture.

This research was approved by the faculty committee at the lead researcher's university before data collection.

3.2 *Semi-structured Interviews*

Semi structured-interviews were conducted with senior decision makers (e.g., chief executive officer, production manager, finance manager) in each business organisation. As Kallio et al. (2016) mentioned in their guidance, it further helped to allow participants to freely express their experiences, opinions and barriers thus providing rich evidence for the study. The interviews were scheduled mainly on the online platform (Zoom) to offer more flexibility to the participants and the research team. However, a few interviews mainly in the agricultural and digital/ creative industry sectors were carried out face-to-face, due to the availability of participants. The interviews were held between June and August 2022. The interview questions were inspired by the literature review of the net zero strategy reports and further input from the council representatives. The questions were distributed via email prior to the interview taking place. At the outset, participants were asked about their level of understanding regarding net zero emissions. The interviews ranged between 30 and 45 minutes and were recorded. See Appendix for the questionnaire.

3.3 *Data analysis*

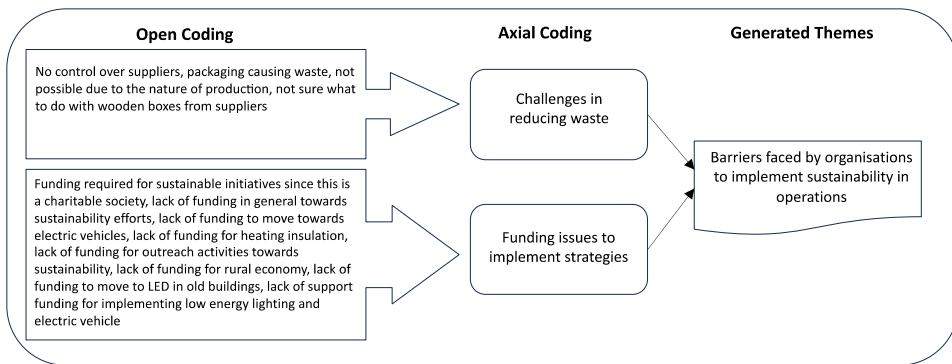
The recorded interviews were electronically transcribed and then transferred in the NVivo Pro software (version 12) for thematic analysis. Transcribing the interviews allows researchers to familiarise themselves with the data. A thematic analysis was applied to identify emerging themes.

NVivo 12 software offers substantive advantages for researchers to systematically organise data and support coding (Jackson and Bazeley, 2019). Constant comparative analysis was conducted where the emerging codes were compared with each other and labelled together according to similarities or differences (Corbin and Strauss, 2015). A memo was created in NVivo 12 to record the reflections during each stage of data analysis, and this was further visited when new codes emerged. Thus, going back and forth by comparing codes, categorising and labelling them while looking back at reflexive notes in memos improved the consistency in analysis.

The data analysis involved an open coding stage where the purpose was to break the data to allow fresh insights into the research question. A line-by-line analysis of the interviews was conducted, and the chunks of data were provided as conceptual categories

(Thornberg et al., 2014). Some of the codes, for instance, ‘hole in guidance’ were derived from the phrases directly used by the participants (Edhlund and McDougall, 2019). Following this, axial coding was conducted where the emerging categories from the open coding were related to each other resulting in subcategories thus deriving themes. The next stage was selective coding where the core categories were identified, and subcategories were unified with the core category. At this stage, the analysis was more focused, and coding was limited to the variables related to the parameters of the core category. For example, Figure 1 shows ‘packaging causing waste’ and ‘not sure what to do with the wooden boxes from suppliers’ were generated through open coding, this was further related to barriers in reducing waste during the axial coding phase. After further analysis the theme on barriers faced by organisations to implement sustainability initiatives in operations was generated.

Figure 1 Example of coding process



Furthermore, once the initial analysis was completed, the framework proposed by Berger-Schmitz et al. (2023) was used to classify the net zero responses by businesses.

4 Findings

Three main themes derived from data analysis are: technological transformation, management practices improvement, and barriers in transitioning towards net zero. In line with the chosen theoretical lens of CRBV, the findings show how organisations utilise their resources and capabilities internally whilst considering the requirements of their sector and wider environment externally.

Furthermore, the findings suggest that despite all organisations in this study showing a positive approach to moving towards integrating sustainability in their operations, the range of these efforts is dependent on characteristics, such as size and sector. For instance, large and medium size organisations in the engineering and manufacturing sectors are actively moving towards carbon footprint monitoring and introducing technological innovations towards tackling climate change. Also, the large organisations seem to have more control over initiating net zero in SCs. On the other hand, smaller organisations have less control over the SC, and they are moving towards initiatives to reduce energy consumption by switching off office equipment and moving towards LED

lighting, for example. However, all the organisations in the sample, despite their size, have waste management initiatives in place.

Figure 2 Strategies developed by businesses in a UK region to move towards net zero

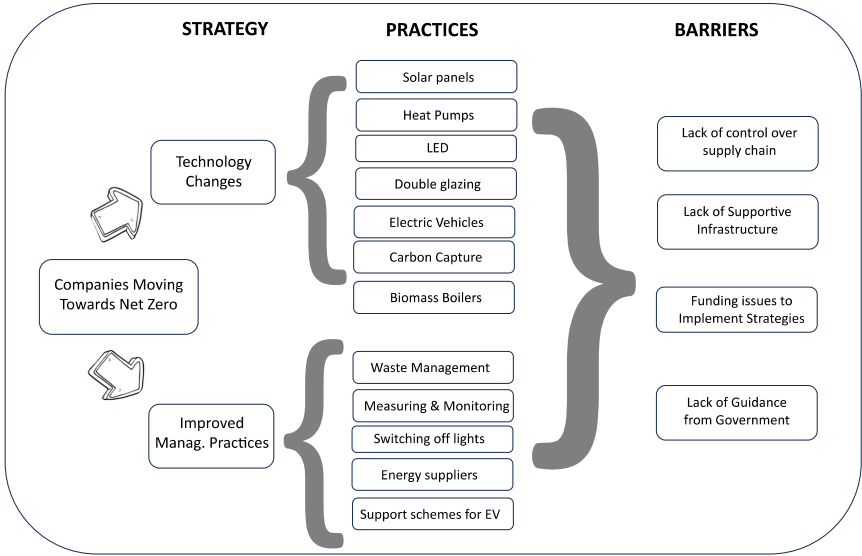


Figure 1 shows how companies are transitioning towards net zero, including the strategies they followed (technological transformation or management improvement practices), as well as practices and barriers they found (see Figure 2).

4.1 Technological transformation

Technological transformation for net zero was identified and included implementing energy efficient lighting systems and renewable energy options (solar panels, heat pumps and biomass boilers). Across different sectors, despite the size of the organisations, participants explained their approach towards implementing energy efficient lighting systems. For instance, organisations explained how they have implemented or are in the process of implementing LED lights on their premises.

“We have started replacing lights, we do have a huge amount of lights here. We’ve started sort of doing it section by section, replacing them. At the moment, we’ve got the 5-foot fluorescent strip lighting in our warehouse. But off the top of my head, there’ll be maybe 2 or 3,000 of them just for illuminating the warehouse. So, we have some quotations to change some to LED.” (Managing Director, Retail, Visitor Economy sector)

“I think it’s something like we had 90% of our lighting is already LED now. We moved over quite a long time ago for that.” (Chief Executive, Hotel, Visitor Economy sector)

“Yeah... well, I suppose we use the energy-efficient bulbs, when others (light bulbs) run out we went and used energy efficient bulbs.” (Business Owner, Farming, Agriculture sector)

In addition, most organisations, irrespective of their size, expressed their interest to implement solar panels and some of the organisations explained having implemented them.

“Certainly we, we’ve managed a large portfolio of buildings and they’re all very different. Only I think eight or nine of them have solar panels.” (Compliance and Procurement Director, Accommodation, Visitor economy sector)

“We’re getting solar panels you know.” (Business Development Director, Media, Digital and creative industries sector)

“Yes. Solar, we’re looking at options, but there is an expense associated with that.” (Owner, Farming, Agriculture sector)

In contrast, few organisations explained initiatives to implement heat pumps. It was the larger organisations, especially in the visitor economy sector, which expressed their interest to move towards implementing heat pumps.

“...and one of those is to move from having a gas fired boiler to having air source heat pumps. So, to create a more sustainable solution for heating.” (Chief Executive, Theatre, Visitor economy sector)

“We removed the old oil kind of system from the house and replaced it with the ground source heat and the electric electrical top up...So those things are interventions that we’ve made and seems to be working very well.” (Estate Chief Executive, Estates, Visitor economy sector)

Organisations in the visitor economy also mentioned the use of biomass boilers in their premises as a technological initiative. This is particularly true for properties that already have available sources of biomass.

“So, if we take our total energy, including the heating as well as the electricity demand forward. We have our own biomass boilers here at the hotel, that powers all of the heating for both, all the bedrooms and the public areas, but also for the swimming pool.” (Chief Executive, Hotel, Visitor economy sector)

“We’ve got a biomass boiler that runs the estate office.” (Estate Chief Executive, Estates, Visitor economy sector)

“Some of the bigger organisations are already moving towards bringing Electric Vehicles (EV) technology into their operations, including the installation of charging points.”

“We have two electric cars, the golf buggy, electric golf buggy and we have two vans that are electric as well. So, we’ve moved that way, and we’ve moved that way about a year and a half ago, or so for electric to start moving on that journey towards electricity. So eventually, I think we’ll do more and more electric.” (Chief Executive, Hotel, Visitor economy sector)

“So, we have a fleet of cars. And again, we took the decision last year that any new cars that are purchased will be hybrid, or electric. So, we have started down that road. We’ve purchased quite a few of the hybrid cars now.” (QSHE manager, Engineering, Manufacturing sector)

“We are looking at installing charging points around the estate for both guests and staff as well so that we can actually facilitate the use of electric vehicles and starting to look at changing our fleet vehicles in the grounds and in agriculture to electric vehicles where possible. So again, trying to reduce fossil fuels. So yes, it’s, I’d say a work in progress.” (Estate Chief Executive, Estates, Visitor economy sector)

4.2 *Management practices*

In terms of management improvement practices for net zero transition, the main ones included: switching off lights, monitoring carbon emissions, waste management initiatives, staff support schemes for EV, and improving energy management (green tariff, procuring renewable energy through energy provider).

Smaller organisations were more involved with switching off lights to save energy than their larger counterparts. When asked about reducing energy consumption most organisations mentioned how they encourage staff to turn off the lights and equipment in an effort to save money.

“Ensuring things are turned off and the heating is turned off ... and that sort of thing. So, energy saving.” (Head of Centre, Outdoor education, Visitor Economy sector)

“We can come up with a long, long list of things that could be done, you know, even down to the simple initiatives of making sure that you know, everyone powers off ...their IT equipment before they leave.” (Commercial Director, Advanced Manufacturing, Manufacturing)

In addition, the findings suggested that large and medium organisations are moving towards monitoring their emissions. For instance, company E explained how they are moving towards measuring scopes 1, 2 and 3 emissions and monitoring the SC where the emissions are reported in their annual report. Similarly, company G also explained how they have started a business plan where they are moving towards calculating their emissions.

“We are required to monitor and report on our emissions annually, so we are aware of our scope 1, 2, and 3 emissions. We also monitor emissions throughout our supply chain, and we have an auditing and reviews of our emissions to make sure that our figures and the data that we gather is robust and then we report on those emissions in our annual report.” (Senior Government Policy Manager, Manufacturing, Energy sector)

“So, we haven’t yet got anything documented to say that we’re going to aim for net zero. We have started down the road recently of calculating our carbon footprint. And it is in the business plan that’s currently in development, that we move towards being carbon negative. But we haven’t agreed to do that.” (QSHE Manager, Engineering, Manufacturing sector)

There is a link between material waste reduction and net zero, this is because it promotes circular economy principles of reusing, recycling and reducing extraction of virgin materials to make new products, which in turn reduce CO₂ emissions. When addressing waste management initiatives the participants mentioned a broad range of initiatives, from paper recycling to farm waste management. As the extracts show while all the organisations mentioned recycling waste, the bigger organisations explained taking efforts to reach zero waste. Several organisations also mentioned that they are looking at reusing materials.

“I’m going to guess it’s kind of getting to a stage where there’s basically zero waste. Anything that is used from a research point of view, by our business is transformed into something else at the end of the line or, or it’s just completely reusable.” (Commercial Director, Advanced Manufacturing, Manufacturing)

“Oh, well, I mean, like I said things like plastic, like in net wrap... we have to take it to a recycling plant and so on. So, basically all farm waste gets recycled.” (Business Owner, Farming, Agriculture sector)

“We do certainly look to get the most out of all the equipment. So, for example, we repair a lot of equipment, and we use within field work, and we also repair and maintain the buildings.” (Head of Centre, Outdoor Education, Visitor Economy sector)

The findings also showed that there is some indication of organisations promoting the use of EV among their staff. This was mainly evident for bigger organisations who have the resources to support these types of initiatives.

“In the last six months we’ve partnered up with a car leasing company called [company name] to operate an EV and hybrid car leasing scheme. And that’s proved to be really popular. So, I think we’re up to about 12 people who have now leased electric cars.” (Compliance and Procurement Director, Accommodation, Visitor Economy sector)

Finally, the findings also identified efforts taken by large organisations to move towards more sustainable energy management. For instance, several participants explained taking initiatives to procure renewable energy and green energy contracts from suppliers.

“We do have a two-year contract with a green energy supplier. And that we intend to continue going forward. So, obviously, that they’re getting their energy from renewable sources. And yeah, that’s a switch we made a while ago.” (Estate Chief Executive Officer, Estates, Visitor economy sector)

“We’re already on green tariffs, green tariffs are more expensive than brown tariffs, but not as expensive as people expect them to be.... And that’s a significant reduction for us because we’re energy intensive, particularly with electricity. So we have looked at self-generation, which does bring about opportunities.” (Sustainability Manager, Engineering, Manufacturing sector)

As the above interview quotes show the majority of the organisations have a proactive approach to sustainability initiatives through technological and managerial practices. However, they explained facing several barriers in their journey towards sustainability.

4.3 Barriers in transitioning towards net zero

In terms of the barriers faced by organisations in pursuing net zero initiatives, the findings showed the following: limited control over SC, limited supportive infrastructure, limited funding to implement strategies, and limited guidance from the government.

Several organisations mentioned having limited control over the SC. For instance, when addressing the issue of waste management, cinema and retailer are mostly concerned with the waste generated from packaging.

“The rest of it is mainly in pack packaging and stuff like that. But that’s stuff that comes from our suppliers that we have no kind of control over how stuff is actively packaged to send to us. There’s a lot of plastic and cardboard and stuff that is just.” (Cinema experience manager, Cinema, Digital and Creative industries sector)

“But so the box is coming from the you know, when we get pallets from Spain, or Italy, all the boxes that are very difficult to deal with, you know the wooden boxes and the cardboard boxes, we’re just trying to work out what to do.” (Manager, Retail, Visitor economy sector)

Organisations raised concerns about limited infrastructure to implement sustainability initiatives in general. This was mostly regarding logistics, location and building structures, charging points for EV and lack of suitable EV vehicles in rural areas.

“Yeah, I mean, our industry here is not directly impacted other than the infrastructure, we have minibuses that transport pupils around. I’ve looked into getting electric minibuses but they’re not quite at the level that’s able to run yet in terms of the batteries are too heavy, if I’m a passenger. So, it’s in a way sometimes frustrating, because we need, say, two mini buses this year. And we’d like to do something, but the technology hasn’t quite caught up perhaps in line with or in sync with where we are.” (Head of centre, Outdoor education, Visitor economy sector)

“Until there’s an electric van that has the range, the range is key because we have to get to London and back, until they have a better range on electric van we have to use a van with diesel.” (Business Development Director, Media, Digital and Creative Industries sector)

Some organisations further mentioned issues with location and building when planning to implement sustainability initiatives.

“Oh, you mean like solar power? Again, you know, really recently, I mean, the restrictions are obvious. I mean the two logical ones, like I said, it’s probably solar panels and wind turbines will obviously wind turbines, you know, everybody thinks they’re a good idea, but when you want to put one up, you don’t want them around the area to view.” (Business owner, Farming, Agriculture sector)

“So, we see there that you know, without good public transport connections, and or, you know, electric buses or whatever we could think about. We do see as a potential threat because we are in a location that requires, you know, transport to get to so, that’s on the visitor side.” (Estate Chief Executive, Estates, Visitor economy sector)

“And there’s some significant work that landlords are doing to this building. And one of those is to move from having a gas fired boiler to having air source heat pumps. So, to create a more sustainable solution for heating, what we’re trying to do at the moment is find a place to site those where there is both sufficient airflow and where they are hidden from view enough to pass planning. So there’s just some hoops to jump through on those but that’s definitely something we’re looking at.” (Manager, Theatre, Visitor economy sector)

Furthermore, some organisations mentioned having to deal with local council/government policies and regulations which hindered their sustainability initiatives.

“Heritage. The fact that you’re not allowed double glazing in a Grade 2 list of building, which is crazy, you know, that’s a massive barrier...they rate heritage over environment.” (Business Development Director, Media, Digital and creative industries sector)

“Yeah, so we’ve got obviously big roofs, just theatre auditoriums are big spaces. And we have investigated the use of solar panels, but there are two major barriers to this. One is [anonymised] Council’s planning department which is very against solar panels in roofs that affect the view of the heritage of the city, particularly those buildings which can be viewed from the roof of the [anonymised name of the heritage building] of which we are one.” (Manager, Theatre, Visitor economy sector)

“Again, I mean, some of these properties are over 100 years old, looking at how we can improve their energy performance. So, loft insulation, draught proofing, new windows, but of course, we can’t do double glazing. We can’t have plastic windows; we have to have wooden double glazed windows.” (Owner, Farming, Agriculture sector)

Most organisations stated having issues with accessing funding to support their sustainability initiatives.

“So, if there was money available, then we could utilise it immediately. With, for example, low energy lighting in the warehouse, with putting more solar panels on the roof, and converting our actual petrol vehicles that we’ve got to electric vehicles.” (Managing Director, Retail, Visitor economy)

“No, because there’s nothing available now for solar, we are too late. There was a grant available a few years ago but it’s finished now. So no, unfortunately not. It’d be great to get some if they let us, when they let us, do double glazing, get some assistance towards that because it’s very expensive.” (Business Development Director, Media, Digital and creative industries sector)

“There needs to be either government support or incentive to allow companies to not, you know, put themselves at a financial disadvantage to try and embrace these things. Because the paybacks tend to be quite long. The return on investment tends to be 10-20 years and most businesses don’t usually operate on that sort of timeframe.” (Estate Chief Executive, Estates, Visitor economy sector)

“I think, you know We’ve tried a few times to get some funding from Innovate UK for research projects, and in different methods of construction and we’ve been largely unsuccessful, I would say. There doesn’t seem to be much support for this area, even though there’s a lot of conversation about it in the House of Parliament, build better, build greener.” (Sustainability manager, Engineering, Manufacturing sector)

Most organisations mentioned having limited guidance or support with their sustainability initiatives.

“Again, the cost elements and the information as well. If you want to do ground source heat pump, there are people that will speak to you, but with regards to solar panels I wouldn’t have the first clue who to contact, and nobody’s contacting us.” (Managing Director, Retail, Visitor economy sector)

“We’ve got competitors that have solar, biomass and all these other things in place. And we get questioned. Well, why don’t you have that? Because if you don’t understand the detail behind it, it can very much look like we just haven’t made the decision to do it and actually, it’s down to that grid connection and the lack of support there.” (Sustainability Manager, Engineering, Manufacturing sector)

5 Discussion

With regards to the research question addressed in this paper: What are the shared experiences faced by businesses in a UK region to move towards net zero?

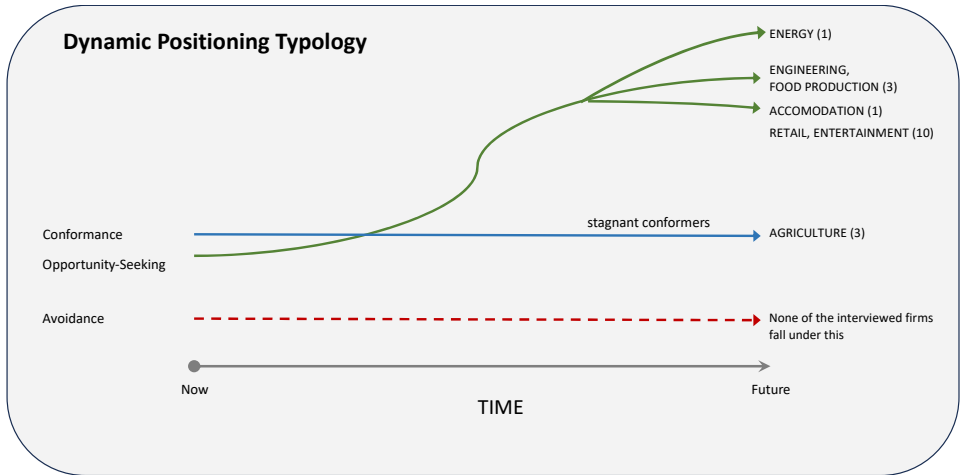
The strategies used by the participating businesses were of technology transformation and management improvement practices. In terms of technology transformation, these involved some relatively low cost, and easy to implement solutions, for example: installation of solar panels, replacing gas boilers with heat pumps, replacement of normal

lights with LED lights, etc. With regards to the management practices improvement, these included monitoring carbon emissions, waste management initiatives, engaging in energy efficiency, etc. This level of progress would indicate a mid-stage level (of efficiency) in a sustainability maturity path, with more progress expected towards the ideal of creating value at the highest level (Ecochain, 2024).

The barriers mentioned by participating organisations included: limited guidance, infrastructure, and funding from the government in order to make the transition to net zero feasible. This is in line with the literature, for example, Rahman et al. (2020) identified those three barriers plus one related to organisational and operational policy, also Murillo-Luna et al. (2011) had already identified four types of barriers: external barriers, endemic limitations of the firm, limited environmental motivation and limited preparation of employees and operational inertia. In this vein, the recommendations from this research to the County council were three-fold. First, to raise further awareness of the importance of transitioning towards net zero, via marketing campaigns and visits to the organisations, especially those sectors that are not usually operating online, e.g., agriculture. Second, to provide incentives via funding directed towards encouraging businesses to adopt environmental/green technologies. Finally, to build the infrastructure needed for the technologies to be used in the long-term, e.g., EV charging points.

Furthermore, our results show the mapping of the net zero responses according to the Berger-Schmitz et al.'s (2023) framework. See Figure 3. Most organisations in our study, followed an 'opportunity-seeking' response, with the exception of the agriculture sector which followed a 'conformance' response, interestingly no 'avoidance' response organisations were found.

Figure 3 Observed dynamic strategic positioning behaviour of sample firms (see online version for colours)



Note: In brackets the number of interviewed firms.

Source: Adapted from Berger-Schmitz et al. (2023)

Some explanations for the businesses' responses above can be found in the literature. For example, Singh et al. (2015) showed that larger organisations were more likely to adopt

comprehensive environmental management systems (EMS) than SMEs, in our sample, the four large organisations were ‘opportunity-seeking’.

In terms of sectors, Singh et al. (2015) found that manufacturing, chemical and agricultural sectors were more inclined to adopt comprehensive EMS than service sectors. Our results are partially in agreement with the agricultural sector belonging to the ‘conformance’ response, whereas companies in the manufacturing, energy and visitor economy adhere to the ‘opportunity-seeking’ response.

In our sample, SMEs were the bigger group, and this study agrees with the view of Williams and Schaefer (2013) that the personal values and beliefs of the owner managers of SMEs are key when these organisations are developing strategies in relation to tackling environmental issues.

The results in this research align with the CRBV, as a combination of external and internal factors for the adoption of strategies, practices and overcoming barriers in their net zero journey.

6 Conclusions

Net zero research has received increased attention in the last few years, this is evidenced by the more frequent calls for research on this topic (UKRI, 2024). This paper has shown that the shared experiences of organisations are similar across sectors and sizes. Taking a contingency resource-based view (CRBV) theoretical lens, we have identified that organisations are adopting several practices which in turn are building strategies, and there are also some commonly identified barriers. The practices, strategies and barriers were identified and classified according to previous research.

The contributions of this research are three-fold. At the theoretical level, a further validation of the model presented by Berger-Schmitz et al. (2023) was found, with a potential for future improvement and a mid-stage maturity level. At the practical level, businesses could move to the next level of maturity in their sustainability journey, including leadership and creating value (Ecochain, 2024). At the policy level, the UK Government could enhance the mechanisms by which businesses can access information, infrastructure and finance needed for net zero transition. Our research has shown that there is no unique pathway that suits all businesses in the same way, their success depends on a unique combination of internal and external factors enabling them.

Limitations of this research include that this research relied on qualitative interviews with one informant per participating organisation. This was mitigated by using secondary data sources such as websites, reports and publicly available information. The respondents were selected as those with the relevant knowledge and skills in relation to their organisation’s position. Another limitation was the sample size, ideally it would have been good to increase but due to time and resources constraints, this was not feasible.

Future research avenues could look at evaluating the practices, strategies and barriers in terms of cost-benefit analysis more explicitly and looking further at the maturity levels. As per a recent McKinsey (2024) report, there are multiple pathways towards net zero transition, however those that are economically feasible would be the ones ultimately favoured. The methodologies for creating such scenarios can be expanded to quantitative methods, e.g., computer simulations, or other scenario-testing techniques.

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Notes

- 1 This paper is based on a report held in an institutional repository, which can be found at: *Strategies towards achieving low carbon and high value added from the economic sectors in North Yorkshire.pdf*.
This paper is based on a report wrote by the same authors and held in an institutional repository, which can be found at: <https://www.york.ac.uk/media/business-society/research/managementperspectives/Strategies%20towards%20achieving%20low%20carbon%20and%20highvalue%20added%20from%20the%20economic%20sectors%20in%20North%20Yorkshire.pdf>.

Appendix

Interview protocol

Strategies towards achieving low carbon and high value added from the economic sectors in [UK region]

What sector does your company operate in?

When was it founded?

How many people work in your company?

Which location is its HQ registered at?

A General aspects

- 1 Are you aware of [UK region]'s aim to become the first carbon negative region in England? Aim to achieve net zero by 2034?
- 2 What does achieving net zero mean to your organisation?

- 3 Do you see scope for adopting better working practices that increase productivity and sustainability?
- 4 Are you aware of the environmental impact that your organisation generates as part of its normal operations?
- 5 How is your sector influenced by these initiatives of low carbon and high value added?

B Improve energy and resource efficiency

- 1 Do you think there are opportunities in your sector to reduce energy bills? How?
- 2 Has your organisation evaluated switching to low carbon technologies, such as LED lighting?
- 3 How do you manage the energy costs associated with your organisations' operations?
- 4 What opportunities and barriers does your organisation face in relation to sustainable energy use in your sector?
- 5 Are there any processes in your organisation where you see opportunities for waste reduction?

C Decarbonise heat and power supply

- 1 What does achieving low carbon mean to your organisation?
- 2 Are there any initiatives for decarbonisation (e.g., use of renewables) that your organisation is currently involved in?
- 3 Have you evaluated switching to low carbon heating options and green tariffs?
- 4 Have you explored options to generate energy on site? (Such as solar PV, heat pumps for off-gas-grid properties)
- 5 What opportunities and barriers are there for sustainable heating and power supply in your sector?

D Develop cleaner logistics

- 1 To what extent is your organisation's transportation and business operations dependent on fossil fuels?
- 2 Can you think of options in your organisation to reduce transport usage and fuel costs?
- 3 What alternative transportation means would your organisation consider to reduce its carbon emissions?
- 4 Is it possible for your organisation to use electric vehicles and similar technologies?
- 5 What opportunities and barriers do you see for developing green logistics in your sector?

E Move towards circular business models and sustainable supply chains

1. What does circular economy mean to your organisation?
2. Do you see scope for a more ‘circular economy’ business model in your organisation’s activity?
3. Has your organisation considered doing a life cycle analysis of its main products/services?
4. To what extent does your organisation reuse, recycle, upcycle, repurpose?
5. What advantages and disadvantages can you see from your sector taking a circular economy perspective?

F Public funding support from national and local government

1. To what extent would your organisation benefit from having public investment in achieving net zero strategies?
2. Have you received financial or other types of support from the public sector to address the challenge of achieving net zero? How?
3. Do you perceive that the current level of support provided by the government is adequate?
4. What specific (additional) support measures from the local government would your organisation consider relevant?
5. What else should the local government do for organisations in your sector with regards to achieving net zero?

Keywords: net zero, high value added, clusters.

Note: The interview should last 45 mins max. For each interview, there must be a time allocated to contacting the company, setting up the interview, doing the interview, and processing the results. Interviews will be recorded. Ideally, they will be done on Zoom, in some cases face-to-face interviews could take place.