ISSUE 14

FIFTYFOURDEGREES

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Foreword

Welcome to the latest edition of Fifty Four Degrees.

It is a privilege to present a wonderful selection of impactful research and valuable insights from across the School's researchers, many of whom I have come to know during my time at Lancaster.

As a School, we pride ourselves on making a difference – to the lives of our students, to businesses across the North West of England and beyond, and to society as a whole. Our Plastic Packaging in People's Lives (PPiPL) project is a prime example of this work, and is the focus of much of this issue's content.

The project works with businesses and groups at all stages of the plastic food packaging cycle, from production to retail to waste management, aiming to improve their understanding of consumer attitudes to packaging, and reduce the gap between attitudes and behaviour when it comes to waste and recycling.

The impacts of the work will be felt in industry and by consumers. Project leaders Maria Piacentini and Alison Stowell show us the importance of collaboration between researchers and industry in their article.

PPiPL colleagues Alex Skandalis, James Cronin and Charlotte Hadley explain how it can be easy to forget the importance of plastic in our lives – until something goes wrong – and Savita Verma and Linda Hendry examine who is responsible for reducing the amount of plastic waste we produce.

Demonstrating the multi-disciplinary nature of the project, John Hardy, from Lancaster University's Chemistry Department – along with our own Matteo Saltalippi – looks at the difficulties of even defining what a plastic is, and how that must be resolved to aid consumers in their choices.

We also welcome Katie Shepherd and Ian Schofield from Butlers Farmhouse Cheeses. The two packaging technologists are part of PPiPL, and they provide an insight into the practicalities of switching to more sustainable packaging in a thriving local company.

Of course, we carry our research into issues of sustainability beyond the boundaries of PPiPL. The Pentland Centre for Sustainability in Business is at the forefront of much of that work, and Director Jan Bebbington describes where they are focusing their attention this year.

The Work Foundation's Trinley Walker turns the spotlight to Lancashire and the future for net-zero jobs, PhD student Colin Hill provides a fascinating insight into attempts to find a sustainable replacement for disposable coffee cups, and Emre Tarim looks at how efforts to encourage green investments and business practices are hindered by being embedded in the financial system.

Beyond environmental sustainability, Katy Mason and Sharon Wagg show how the Mobile Access North Yorkshire project works with communities to ensure the best results for them from 5G expansion, Beth Suttill explores beyond the stereotypes of NEETs, and Saurabh Singhal considers the effects of India's caste system on education and employment opportunities.

I hope you enjoy reading about the work we are producing as we continue to play our role as a responsible management school.

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Working together to solve real-world problems

Working together, academic researchers and industry professionals can make a real impact on the major challenges facing society. ***Dr Alison Stowell***, ***Professor Maria Piacentini*** and ***Stephen King*** explain how the ***Plastic Packaging in People's Lives*** project brings academia and industry together, and how to build a template for success.

Solutions to societal grand challenges require sustained collaborative efforts from diverse organisations and stakeholders. In the realm of climate change, the UK has the challenge of clean growth.

Towards this end, UK Research and Innovation funded the smart ***sustainable plastic packaging (SSPP)*** programme to "establish the UK as a leader in smart sustainable packaging and support a reduction in waste entering the environment." Central to this programme is the emphasis on collaboration between researchers and plastic packaging supply chain members – from packaging producers to final product retailers – to develop and share innovative solutions which ultimately reduce environmental impact.

Here at Lancaster University, we are leading the multi-partner ***Plastic Packaging in People's Lives (PPiPL)*** project, exploring how plastic food packaging is embedded in consumers' day-to-day lives. We are working with eleven industry partners (from retail, supply chain and waste management) to develop insights into consumer, business, and waste management practices, and to drive cleaner, greener growth.

Working closely with partners in a co-creative approach creates a virtuous cycle. External voices provide interesting, relevant and nuanced questions that underpin our work. Here are some of the key issues we have identified for successful partnering.

IDENTIFYING 'REAL' REAL-WORLD PROBLEMS

When talking about solutions to global challenges, our experience is that the detail around 'what the problem is' comes from open, authentic and ongoing dialogue between academics and practitioners. Through regular conversations, we learn more of the specifics of the meaningful problems for practice, and broaden our thinking about the grand challenges. Without first identifying what the problem is, how can we talk about potential solutions?

Reflecting on the development of our PPiPL collaborations, we knew we were broadly interested in plastics and consumption – it was only through

> ...there is clearly a real break between consumer intentions and their purchasing actions when it comes to plastic packaging...

talking to retail partners about their perspective that our focus landed on food plastic packaging as an exemplar to scrutinise consumers' attitude-behaviour gap.

> *"We are striving to reduce the amount of single-use food plastic packaging we sell through our stores. We believe this research will help us ensure that we can please our customers whilst meeting our environmental obligations." (Booths)*

> *"The project will inevitably help the retail sector understand how customers can be encouraged to use alternative food packaging solutions and identify opportunities to reduce the overall volume of packaging used throughout our supply chains" (Waitrose)*

Being flexible and open to the ideas and input of the partners was important, and ensured we focused on concerns of 'real' real-world relevance for industry. These partner conversations can also act as a catalyst for identifying who else needs to be in the conversation, and ultimately helped us assemble the wider partner network. An openness to new perspectives and views really helped, as did a willingness to reach out to potential new partners when we identified gaps in skills and knowledge. We spent time with each potential partner and listened to what they had to say to ensure there was mutual interest.

> *"As set out in the recent Green Alliance/Circular Economy Task Force report **Plastic Promises**, there is clearly a real break between consumer intentions and their purchasing actions when it comes to plastic packaging, whilst at the same time a strong perception within retailers that they must make the move away because of consumer interests. This research is a serious attempt to address a major lack of knowledge in this area." (IOM3)*

GOOD KNOWLEDGE EXCHANGE

Another key component is the way partners support knowledge exchange and learning across the project. This is important for ensuring there is something of value to the partners and the project.

As with setting up relationships, open and regular communications are key, identifying areas of common interest, and creating a feedback loop.

Our project needs to be responsive and retain relevance over its three-year duration. Working with partners, we have an enriched understanding of the complexity of plastic packaging and have created mechanisms for knowledge exchange between and across partner organisations. Our regular partner meetings, as well as formal knowledge exchange events, are important for this purpose.

> *"Understanding more deeply how people relate to plastic in everyday life will help us structure better collection and re-use campaigns. Engaging with major industry players through projects like this will help us foster constructive dialogue in which we can feed back some of the real-world difficulties of working with waste materials." (RELIC Plastic)*

> *"As the waste collection authority, we are very well aware of issues caused by plastic waste and recognise the solution requires a systemic approach. This project will support us to grapple with the challenge of reducing the volume of plastic packaging waste." (Lancaster City Council)*

Partners are responding and adapting to changes brought about by shifting patterns in the economy, government policy, market demands, new innovations, and civic society pressures. Close working between partners and academics ensures we all develop our thinking. Examples include: the need to stop demonising plastics in white papers, media and research; reflecting on how the word 'plastics' does not reflect the complexity of the material(s), technical functionality and different uses; how consumers purchase the product not the packaging; and the costs of alternatives – not just financial.

> *"I think the project has more value than ever (after COP26) with the acceleration to move towards a low- carbon economy." (Biotech Services Ltd)*

> *"We continue to explore the alternatives to plastic packaging within our brand portfolio and across our business and see the project of great value to our journey." (Bells of Lazonby Limited)*

> Real-world problems require collaborative solutions between industry, civic society and academia.

Given the ongoing nature of the relationships, communication and responsiveness is important. So too is sensitivity and adaptation, especially retaining sensitivity to the partners and adapting to organisational changes.

Within project teams, especially inter-disciplinary teams, it's important to pay attention to cross-fertilisation and translation of ideas. Finding a common language can be time-consuming but it is key, particularly when working with partners from different backgrounds.

REFLECTIONS ON THE NETWORK

Real-world problems require collaborative solutions between industry, civic society and academia. This can help mitigate unintended consequences by having different voices in the room and recognising whose voices are missing.

> *"CIWM has a unique understanding of the sector, and our professional knowledge and trusted reputation enables us to inform and influence legislation and policy, playing a vital part in shaping the future role and reputation of the sector. Having a depth of expertise across the resources and waste sector to support the creation, maintenance and development of all CIWM's outputs, research and services, we are pleased to support the project." (CIWM)*

> *"SUEZ believes that increasing the circularity of waste in the UK involves system-wide changes that cannot be solved by an individual entity, however large, acting alone. Further, any solution must involve both consumer engagement and wider initiatives across the supply chain. Behaviour change is fundamental to success in many of the day-to-day activities that represent core business to SUEZ and this project has the opportunity to add significantly to this topic area." (SUEZ)*

Our network members provide valuable and crucial insights into the issues surrounding plastic packaging. They challenge, stimulate, and feed our thinking, and serve an important sense-checking function for PPiPL, vitally important for delivering solutions to societal grand challenges around consumption of plastics.

Dr Alison Stowell and **Professor Maria Piacentini** are the co-principal investigators for the ***Plastic Packaging in People's Lives (PPiPL)*** project.

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JUST WHAT DO WE MEAN WHEN WE SAY PLASTIC?

Plastic presents many problems in the many worlds – from litter on the street to unsustainable packaging. But *Dr John Hardy* and *Dr Matteo Saltalippi* explain how there is a big issue when it comes to tackling the environmental consequences – knowing just what a plastic is in the first place.

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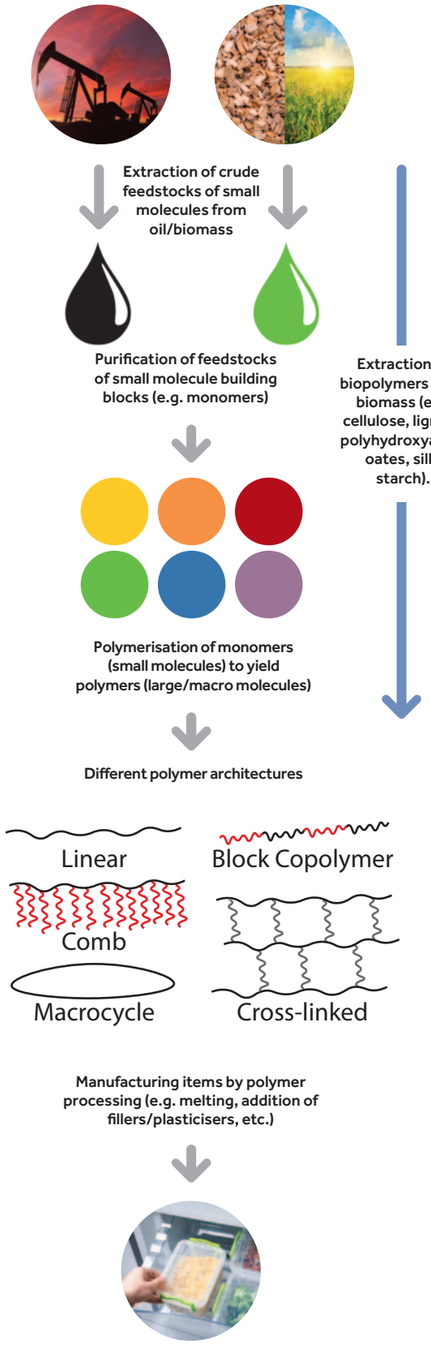

The English language is constantly evolving, which presents interpretation challenges due to issues related to a user's choices or understanding of vocabulary, grammar and expression. One word that exemplifies this is 'plastic'.

Take a look in the dictionary and you will see 'plastic' can be either a noun or an adjective:

- Plastic (countable noun), any one of a group of materials that when soft can be shaped into different forms, and has many different uses.
- Plastic (singular noun), money (i.e. a credit card) to pay for something.
- Plastic (adjective), soft enough to be changed into a new shape.

When you have different possible definitions, complications are bound to arise, both for experts and the general public. These variations mean 'plastic' can be used to describe any material based on polymers (of which there are many examples). Just as importantly, a variety of materials display plasticity – including but not limited to clays and metals at high temperature – while not being what many of us would have previously thought of as plastic.

The ***International Union of Pure and Applied Chemistry*** (IUPAC) is the world authority on chemical terminology. It develops and maintains recommendations that create a common language for the global chemistry community. Their definition of plastic is "a generic term used in the case of polymeric material that may contain other substances to improve performance and/or reduce costs". For non-chemists among you, we hope that's clear. If not, then it might comfort you to know that the IUPAC note that using the term 'plastic' instead of 'polymer' is a source of confusion even to their expert audience, and thus they do not recommend its usage.

So then, let us instead consider 'polymer'. IUPAC – them again – define a polymer as "A substance composed of macromolecules." This is hardly the type of language we need to communicate with the general public when it comes to plastic usage and recycling, especially when they go on to define a macromolecule as "A molecule of high relative molar mass, the structure of which essentially comprises the multiple repetitions of units derived, actually or conceptually, from molecules of low relative molar mass." If you were not confused before, the chances are, you are now.

A simplified process for the production/isolation of polymers from various feedstocks (e.g. fossil fuel or biomass) is depicted in **Figure 1**, and rigorous life cycle assessments (LCAs) are necessary to understand the environmental impacts of each individual plastic product.

There are multiple initiatives to facilitate us to reduce the amount of waste we create, encouraging and facilitating us to reuse, recycle or compost products. However, just as the term 'plastic' comes with many complications, so too the terminology related to recycling and recyclability, (bio)degradation and compostability can be complicated and difficult to interpret for the everyday consumer. That will have an impact on the effectiveness of any initiatives to improve behaviours.

IUPAC describes degradability as the "capability of undergoing degradation" via physical and/or chemical deleterious changes of some properties, and a non-exhaustive list of examples of degradative processes is highlighted in **Figure 2**. It is important to note that while biodegradable polymers are degradable – they can be broken down either biologically or chemically – not all degradable polymers are biodegradable (products that can be broken down by bacteria or other organisms), and polymers made from biomass-based feedstocks (i.e. non-fossil fuel-based feedstocks) are not necessarily degradable, reinforcing the importance of rigorous LCAs when understanding the environmental impacts of products.

Waste management is a societal grand challenge. The language used to describe materials has an important impact on the effectiveness of any initiatives to facilitate us to reduce the amount of waste we create, to reuse products, or to recycle or compost products.

It is therefore important that steps are taken to simplify this language for people, potentially via policy changes that have already proven effective in energy and other sectors. Perhaps the plastic product production process needs oversight from an impartial externally-accredited LCA awarding body, ensuring level standards across the board.

Doing this will enhance communication and knowledge between consumers, local authorities, waste management companies, recyclers, and all other stakeholders in the post-consumption chain. This will generate better understanding of plastic products and how to effectively reduce, recycle, and/or compost them.

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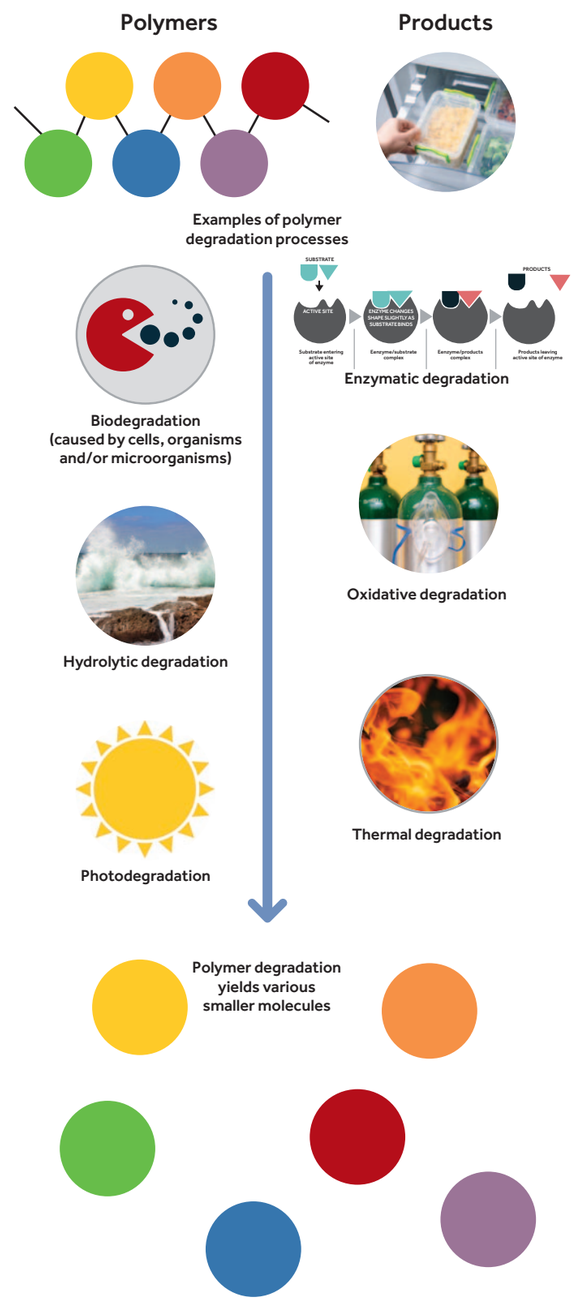

PLASTIC: MAKING OUR OLD COMPANION VISIBLE

We encounter plastic in most arenas of our everyday lives, yet we never really think about it. ***Drs Charlotte Hadley***, ***James Cronin*** and ***Alexandros Skandalis*** look at how easy it is to ignore the role of plastic until something goes wrong.

When you think about 'plastic', what comes to mind? The ballpoint pen you write with? The television you sit in front of? The sneakers on your feet? The floss you pull between your teeth? The packaging your food is wrapped in?

For most of us, we don't give much thought to 'plastic' at all, and seldom, if ever, consciously attribute its presence to our personal belongings. Yet, we have been living in the ***"Age of Plastic"*** for much of the recent history of our consumer culture.

This ubiquitous and mysterious category of materials is consumed and relied upon for all manner of daily activities. Yet, in almost all of its variants and applications, plastic is rarely thought about until something goes wrong. "Useful, convenient, inexpensive, and so common as to be invisible", the cultural historian Jeffrey Meikle recounts in his work ***American Plastic: A Cultural History***. "Plastic objects attracted notice only when they broke".

Plastic can attract your notice when a polypropylene shelf in your fridge has cracked, and it is more convenient and cheaper to replace it, rather than try to repair it. Alternatively, you might notice that someone has perforated the acetate window of a sandwich pack you were about to buy, so you choose an untampered one instead. Or it could be that you notice the polyurethane soles of your shoes have started to deteriorate, so you're off to the shops to buy a new pair.

> **plastic is wreaking perhaps its most significant havoc away from our direct line of sight. Giant gyres of marine debris are accumulating in far-flung oceans and seas.**

Although, they make plastic apparent to us, these minor inconveniences are rarely overcome in environmentally sustainable ways. When inconvenienced by plastic, it has become normal to quickly replace the offending item and return our thoughts of plastic to the background.

But the plastic objects that are replaced still exist, even when they have been "thrown away" and are no longer thought about. "Away" is a contentious concept, as plastic waste never truly goes away– it tends to stick around. We are forced to contend with the stubbornness of plastic in many corners of our local environment, whether the flotsam that ***becomes more commonplace in our canals and waterways; the broken appliances illegally dumped at the sides of country roads***; or the rubbish that cascades down our streets when ***lifted from our recycling boxes by strong winds.***

In these instances, plastic can once again appear as a troublesome material, or what British anthropologist ***Mary Douglas*** might call 'matter out of place'. But beyond its localised visibility, plastic is wreaking perhaps its most significant havoc away from our direct line of sight. Giant gyres of ***marine debris*** are accumulating in far-flung oceans and seas. Microplastics have been found in Antarctic ice and deep-sea sediments. Plastic has even been discovered ***near the peak of Mount Everest***.

To hasten the public's response to what can seem like an impending catastrophe, plastic's visibility is sometimes forced upon us by social actors. Last year, ***Greenpeace dumped more than half a tonne of plastic waste outside 10 Downing Street*** to make visible the grotesque amount of plastic rubbish that the UK sends overseas every 30 seconds. Also in 2021, Ali Tabrizi's documentary *Seaspiracy* confronted Netflix's audiences with the stark images of plastic pollution caused by discarded fishing nets and equipment in our oceans. These ultra-visual efforts work to arrest audiences' emotions, thus sparking waves of ***'mainstream malcontent'*** on social media platforms and stimulating a conversation among consumers.

Though useful, it should not take mass-mediatised outrage and popular reactiveness to challenge plastic's invisibility and demand change from industry and government. Sustainability must work from pre-emptive not just retroactive measures. Debate and transformative action will be best served from instituting mindfulness of plastic's presence in our consumption environments and markets long before its problems become visible.

Context-specific education, intervention, and regulation must pre-emptively make visible the plastic materials and objects that accompany us on our many consumption journeys before those same items end up causing trouble later. Take the UK's summer music festivals, for example. Abandoned festival tents account for an estimated 900 tonnes of plastic waste each year alone. That's not counting the many other cheap and disposable artefacts bound up in the festival experience, from ponchos, sleeping bags and fold-up chairs, to beer cups, clamshell food containers, and water bottles.

To prevent an escalating issue, retailers must be discouraged from marketing items like tents as single-use consumables and both organisers and festival-goers should be educated and incentivised to be mindful of their plastic footprint.

Likewise, in the build-up to seasonal celebrations over winter, the streets and homes of Britain are transformed into Christmas spectacles, adorned with artificial trees, lights and decorations, and kitchen cupboards and fridges are stocked with self-indulgent food and drinks. Only after the celebrations does plastic make an appearance when it materialises through the volume of food and gift packaging that fills household waste bins.

These instances show us how easy it is to take the growing prevalence of plastic in our everyday lives for granted and how quickly we can cast aside our attitudes towards waste and pollution.

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ARE SUPERMARKETS THE NEW-AGE PLASTIC WASTE PROCESSORS?

If supermarkets and retailers are to do their bit to address issues around plastic packaging, they need to find initiatives that work for the whole supply chain – from producers to consumers. Dr Savita Verma and Professor Linda Hendry look at how they might do it.

The need to rigorously reduce single-use plastic and the urgency to effectively recycle plastic packaging is well recognised by industry and consumers alike. And if you ask an average person the following questions:

Who is responsible for placing a staggering amount of plastic on the market?

Who is responsible for educating consumers around plastic waste and its disposal?

You might hear 'retailers' or 'supermarkets' in response.

To put things into perspective, it is important to understand the scale of plastic production and consumption in the UK, and how it is perceived by consumers. According to the ***SUEZ report***, an estimated 215 billion items of flexible plastic packaging – such as confectionery wrappers, pet and baby food pouches, bread bags and crisp packets – are placed on the market each year.

Flexible plastic packaging remained non-recyclable for a long time due to the lack of infrastructure to collect and recycle it. As per the SUEZ report, only 10-17% of UK local authorities collect some form of film or flexible packaging. Consequently, the vast majority ends up in residual waste streams, and is sent for incineration or ends up in landfills.

There is an increasing amount of evidence that 2017's David Attenborough-narrated BBC documentary series *Blue Planet II* drove a sharp surge in the awareness of average consumers around the impact of single-use plastic on the natural environment. According to reports, retailers noticed a huge ***shift in consumer behaviour***. However, there are other ***studies*** that show the documentary may not have discouraged consumers from choosing plastic. Indeed, there are many factors that influence an individual's behaviour to behave in a pro-environmental way – understanding alone cannot drive action

Even so, in the light of *Blue Planet II*, UK grocers were seen to step up to the challenge of tackling plastic waste crisis, placing plastic high on their sustainability agenda. In recent years there has been an increased effort to provide sustainable packaging options in line with their commitment to ***UK plastic pact***.

During interviews for ***Plastic Packaging in People's Lives (PPiPL)*** with food industry representatives across the supply chain, including packaging manufacturers, technologists, food processors, wholesalers, product suppliers, policy advisors, and compliance consultants, we found stakeholders recognise the need for collaboration to develop a system wherein retailers, consumers and waste management companies work in tandem.

It was striking that *Blue Planet* was often mentioned by industry participants as the driving factor for organisations to make plastic packaging a priority in their sustainability strategy. The most promising sustainable packaging initiatives to reduce single-use plastic packaging as major retailers and brands trial new initiatives are ***reuse options***, including refill on the go, refill at home, return on the go and return from home.

RETAILERS AS WASTE PROCESSORS

In the absence of kerbside collection systems for certain packaging, such as flexible packaging, some retailers have promoted alternative ***return schemes*** for customers in their stores, although on a relatively small scale. More retailers are introducing reuse and refill systems and packaging return outlets.

In our interviews, the procurement manager of a leading food retailer said:

"I don't think we [consumers] do a good enough job [recycling], which is why I think... the Tescos of this world then have to step in and say, 'okay, we're going to help you. We're going to make this easy for you. We will put a collection point in our stores every time you shop with us, please bring your soft plastics back with you and we will take it off your hands and we will do something positive with it'."

Recently, WRAP announced the ***nationwide in-store collection*** of flexible packaging will be made more prominent and consistent. The UK Government also expects to set higher recycling targets for producers, as well as for initiatives that go beyond recycling and support the circular economy, such as promoting re-use and refill. The imminent packaging tax is already having a cascading effect on different packaging materials, making retailers proactive.

Since there is an increasing ***shortage of plastic for packaging*** with recycled content, and the prices of those materials are skyrocketing, retailers have taken charge. For example, some have already started ***investing in recycling plants*** to help them recycle soft plastics like crisp packets and chocolate wrappers, which cannot be currently recycled in the UK due to a lack of infrastructure. Additionally, this may help retailers produce packaging to meet their own demands and avoid competing to source the materials. In that sense, plastic waste has become a valuable commodity, and it leads us to conclude that retailers are on the path to becoming the new-age plastic waste processors.

NEXT STEPS...

Retailers have come a long way, but there is more progress to be made. To engage more consumers and help them adapt to the ongoing changes, retailers not only need to provide easy solutions, but solutions that sustain long-term behaviour change. In the grander scheme of things, it may require retailers to follow a network approach to develop a nationwide system that offers consumers the flexibility to buy in different packaging formats and return packaging to convenient locations, both in-store and online, across multiple retailers irrespective of where they buy from. Retailers will benefit from collaborating to make such an operation commercially viable.

Most importantly, retailers have an edge in trying to create a mass behaviour shift as they are capable of offering convenience to consumers by making facilities and processes more accessible. Further, it is important for retailers to develop interventions keeping consumer convenience in mind to avoid unintended consequences that may do more harm than good. For example, consumers driving more miles to find a store that sells in refillable packaging or accepts their used flexible packaging to be recycled.

So, if a consumer today might say retailers are responsible for reducing, collecting and recovering plastic packaging, our evidence shows they are making strides in doing just that.

Dr Savita Verma is a Research Associate in the Department of Management Science working on the Plastic Packaging in People's Lives project. Her research focuses on how individuals perceive sustainability and how attitudes affect their motivation and behaviours, such as green and pro-environmental behaviour.

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The challenges of plastic-free packaging

Over the past decade, attitudes towards plastic food packaging have changed immensely. Ian Schofield has worked in the packaging industry for four decades, and shares his experiences of how opinions and practices have evolved.

I've been in packaging since 1978, when I trained as a packaging technologist with the Co-op. At that time, I was moving everything in all the factories – from biscuits to margarine to drinks – to plastic. We were moving away from materials like cellulose and paper. Plastics were the new solution – they were cheaper and they provided a barrier for foods. All these years later, we're now moving out of plastics and into some of those same natural materials, and some new ones.

I've worked in packaging all around the world over those 44 years. I was at Iceland three years ago, when they became the first retailer to announce they were ***going plastic-free – by 2023***. It caught the public imagination, and it was all over the press and TV. It sent a message to all the other retailers, and all the other brands around the world, that, we have to do something; we have to turn the plastic tap down.

It has since become a much bigger subject. It is about ensuring we have the infrastructure not just to turn the plastic tap down, with alternatives, refills, reducing consumption, but also it's about looking at the new materials, like ***algae*** or ***seaweed***, to replace that plastic. Some of them are ready now, some are not.

Across all the products in our supermarkets, everything is being looked at – to either replace the plastics, or reduce it as much as possible. If that's not possible, then it's about making sure it is part of the circular economy, and it can be recycled, reused. We don't want it to be turned into benches or tables, we want it to be used again. We certainly don't want to burn it, and we definitely don't want to send it to landfill, or overseas.

Not only are consumers wanting change, we also have legislation. We've got a ***plastics tax*** coming to the UK which companies will have to pay if there is not a percentage of recycled materials – collected at kerbside from our houses – in our plastics. On hard plastics, like milk bottles, that's okay – we are going to be able to do that; on soft plastics, we will not be ready, so all packaging suppliers will be paying more tax.

WIDE-RANGING CONSEQUENCES

The shift from plastics has an effect in every area – food service, restaurants, stores. We now have avocado straws instead of plastic; paper bagsat the checkout; ***Amazon have changed their packaging to be nothing but paper***.

This has a massive knock-on effect away from plastics – is there enough paper capacity? Even though three trees are being planted for every one coming out around the world, even though it is being made sustainable, because the demand is moving so quickly, we are struggling to get paper and board.

That's why recycling all that paper and board is important across retail, food service, online. Consumers understand that, and do it easily, but when it comes to plastics, it's a whole different ball-game, with lots of added complications.

There will be questions about bio-products – products that are biodegradable, but there is no kerbside collection for those compostable materials. You might be able to put them in industrial composters, or back in the land, but there is no council collection. Also, if you put bio-products in with plastics, it contaminates the waste. We're trying to get the circular economy working, to recycle, and that cannot be done if you put bio-products in with it.

There are undoubtedly challenges ahead, but just look at the progress in the last five years. Efforts are continuing to ensure businesses big and small are cutting out unrecyclable plastics from their supply chains – as we have been doing at Butlers Farmhouse Cheeses – and there is sure to be innovation and improvement in the next five years and beyond.

Ian Schofield is a packaging technologist with more than 40 years of experience in the food packaging industry. He works with ***Butlers Farmhouse Cheeses*** on developing their packaging options. He is a Fellow of the Institute of Mining, Materials and Minerals and is a visiting lecturer at two universities.

Butlers Farmhouse Cheeses have spent the last three-and-a-half years working on the transition away from non-recyclable plastic packaging. Packaging technologist Katie Shepherd has worked with Ian Schofield to lead the charge, and explains the challenges and achievements on the road to new beginnings.

Sustainability has always been at the heart of the company – it's part of the ethos. It's a farming family, and everything has to be sustainable. But sustainable packaging had not really been on the agenda until the last three-and-a-half years, since when we have come on leaps and bounds. Because we care so deeply, we have gone headlong to convert the whole company to go on this journey, and now we're leading the market.

Cheese is one of the most complicated packaging formats you can have. We have a living product – cheese is still breathing and maturing. We have to make sure we don't degrade that with packaging changes and keep the quality of our product high. It is a massive task. It's made more complicated because we have three main types of cheese – soft cheese, hard cheese and blue cheese. The cheeses all have different characteristics, different maturing stages, all need different breathability rates.

The packaging that had been around them, had been there for the 40 years since the business started. It has lots of chemicals around it which can't be recycled. Now the packaging we use can be recycled, and it was a real challenge to get to that stage.

No-one really thought about the packaging before, now it's done at the same time as the product development. We've made it part of everyone's job. There can be downward pressure from the board saying 'you have to get on with that', but that only goes so far. We all need to be on the same page for things to work, you have to believe in what you are doing – it's for our team members' future, their children's future. Once everyone understands that, we have had nothing but cooperation.

The packaging is much better for the environment now, but for the most part it doesn't look any different to how it did four years ago. We have been able to keep the same format, using the same machines. This has kept the costs down, and made our goals realistic and achievable.

Our first step was to have packaging that can be recycled. That's what we've done. None of the packaging could be recycled before, but now every single one of our items can be recycled. Our next stage is to get out of plastics entirely. Consumers don't want plastic, so we're working really hard on testing new materials for shelf-life, distribution and all those things. Things are moving at a rate of knots. More people now want to buy British and want sustainability – we can meet them on all sides.

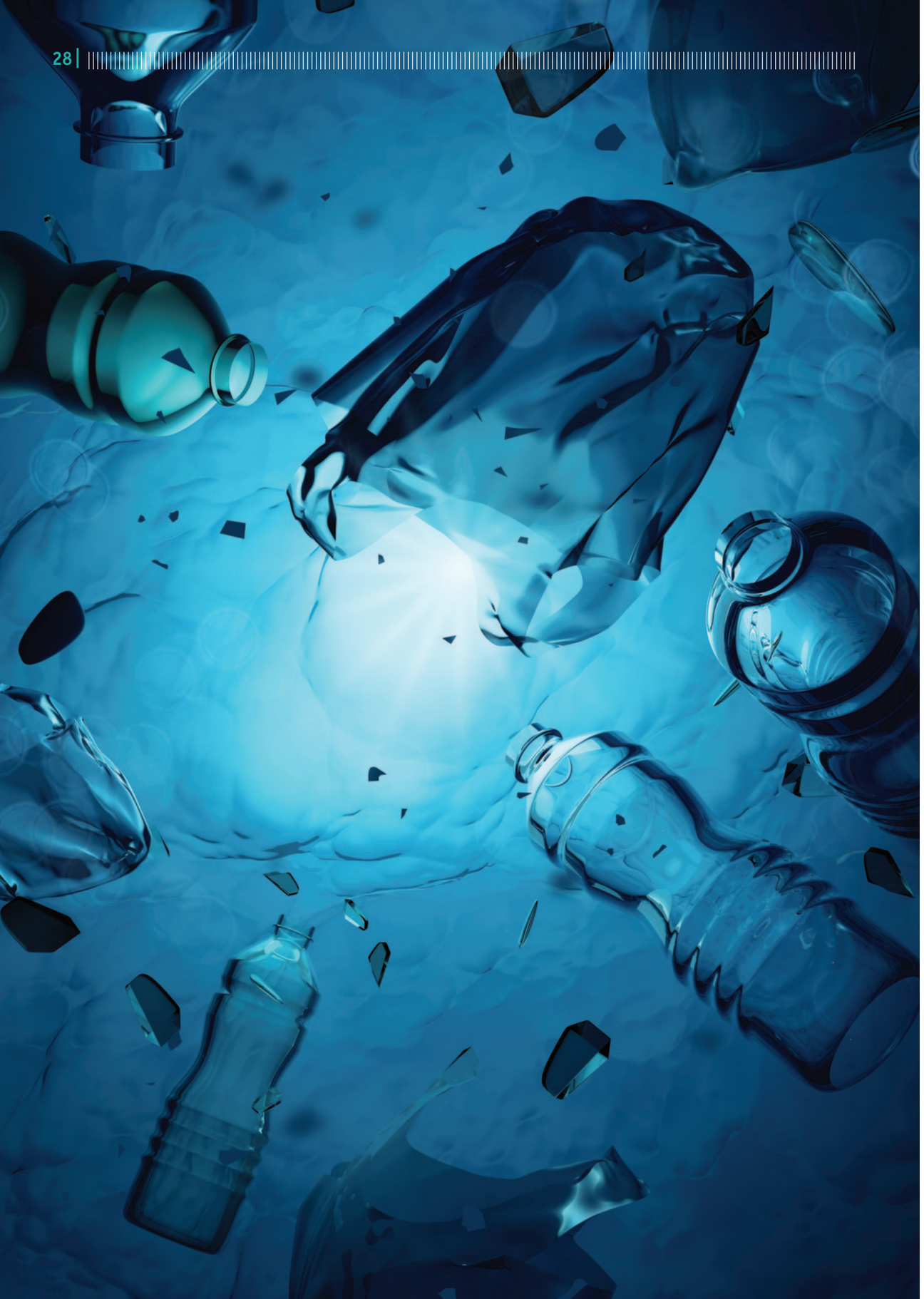
Already, we are planning for Christmas this year and next year, to make sure we are more sustainable than we are now.

Katie Shepherd is a packaging technologist at ***Butlers Farmhouse Cheeses***, an independent family business based near Preston. She holds a BSc Business Studies degree from Lancaster University Management School.

Butlers Farmhouse Cheeses are a partner organisation for the ***Plastic Packaging in People's Lives*** project. They are working on research, trials, and communication with suppliers and customers to move away from non-recyclable plastic packaging, towards recyclable and non-plastic options for everything they supply.

FRAMING SUSTAINABILITY CHALLENGES

The Plastic Packaging in People's Lives project is just one element of the sustainability research taking place in Lancaster University Management School. *Professor Jan Bebbington*, The Rubin Chair in Sustainability in Business, and Director of the *Pentland Centre for Sustainability in Business*, places these various aspects into the wider framework within which sustainable development concerns emerge.



Concerns about human impacts on the environment, and what those impacts mean for human wellbeing, are not new. Communities and governments have long known and acted to try to ensure the links between environmental integrity and social/economic outcomes are managed holistically.

This was the case for the management of common resources (such as fishing activities) by local communities as well as, for example, the maintenance of forests to ensure supply of timbers for shipbuilding among European colonising powers in centuries past. What has changed in our time, is the scale of such impacts.

During the last century, there was an uptick of human use of planetary resources and associated pollution effects, with all measures of human impacts on the planet increasing in the 1950s (this time period is sometimes called the ***'great acceleration'***). Activity has always had local effects, but what scientists found is that these effects were also generated at a planetary (earth system) scale.

Earth system science focuses on how the planet as a whole functions, and how the interactions between various aspects of the earth system manifest (for example: water cycles, the flow of materials, greenhouse gas concentrations and biological diversity). While there are many ways in which these perspectives can be laid out, for the purposes of this article I will highlight three significant aspects, namely: climate change; biodiversity loss and materials flows.

Climate change has been universally recognised by governments as constituting an existential threat to human wellbeing, with many countries passing legislation and supporting policy approached to reduce emissions rapidly and move to a 'net zero' position as soon as possible. Living in the North West of England, it was impossible to miss that the UK Government co-hosted the most recent international 'conference of parties' (COP26) in Glasgow, with the next COP taking place in Egypt in 2022.

These meetings are part of the ongoing process of decarbonising the global economy in order to try to stabilise global average temperatures and to limit climate-related harm (such as fires, floods and storm damage) across the globe. At the same time, business and other organisations have sought to ensure they reduce emissions from their activities and are in line with global ambitions.

Climate change is not the only issue to be addressed, but it is one that intersects with other issues of concern: for example, extinction rates increase as the climate warms.

Biodiversity loss is the subject of inter-governmental coordination through the ***Intergovernmental Panel on Biodiversity and Ecosystem Services*** (IPBES). Biodiversity relates to the living parts of the planet, and 'ecosystem services' describes how we derive services such as food, materials for making clothing and nutrients essential for good health from the living world.

The concerns around biodiversity include species extinction, as well as how changes in how the 'web of life' operates will affect societies' ability to sustain food sources. This is the connection that exercises people concerned with ***the health of bees and other pollinators***, as well as the hidden life in soils that ensure they are ***full of nutrients that support food production***.

Concerns around the distribution of living systems are also behind ***worries around deforestation***, as well as the simplification of natural systems such as they are more susceptible to shocks.

Concern around material flows has less formal inter-governmental architecture to date, but is increasingly being focused upon. This includes a diversity of issues including the generation of plastics (alongside where they end up after use and how they might affect our health) – as highlighted by the Plastic Packaging in People's Lives project elsewhere in this issue; the effect of nitrogen and phosphorus pollution (as a side effect of fertilizers which are themselves used to support food production); and the extraction of minerals that underpin much of our technology (such as mobile phones and renewable energy technologies such as batteries). There is no current formal intergovernmental process on these issues but it is likely that one will emerge in the near future.

The final observation I should add relates to where people rest within these issues. The short answer is we are everywhere; humankind is not separate from the biosphere, but an integral part of it. This is a new appreciation of what was perhaps known in the distant past, that human societies have to live in harmony with the planet as we depend on nature directly or indirectly, regardless of whether we realise it.

While this insight has deep philosophical roots, it also has some practical implications for organisations everywhere and to scholars (such as those showcased from both aspects in this issue) in many relevant disciplines.

Professor Jan Bebbington is the Rubin Chair for Sustainability in Business, and Director of the Pentland Centre for Sustainability in Business.

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Flat White. Hold the Pollution

The disposable coffee cup has long been a target for environmental ire. PhD researcher *Colin Hill* is working on how customers and companies can be encouraged to use and responsibly dispose of a new generation of single-use cups without the plastic lining.

Ever since Hugh Fernley-Whittingstall waged a war on waste in ***his BBC show***, disposable coffee cups have been living on borrowed time. These cups, offered up by major chains and small, independent coffee shops around the world have come to symbolise the modern trend for creating endless waste that has long-term environmental damage.

Single-use coffee cups have been around for a long time, and the latest iterations are made with a polyethylene (PE) lining – a plastic that takes around 450 years to fully break down. Added to that, PE is a by-product oil, derived from crude oil or natural gas, a finite resource. The environmental impacts are damaging both through production and after their use.

My work focuses on the challenges and opportunities we face when it comes to replacing the PE lining. I work with a PhD colleague in Lancaster's Chemistry department, who is working on the science, while I look at how the implementation of new materials would reach the market, and the potential barriers involved.

CONVENIENT, BUT NOT GREEN

The current PE-lined version of the coffee cup is popular mainly in Global North countries, where a focus on health and hygiene made single-use products the preferred option over the last century.

Aligned with the popularity of fast food, convenience of eating in cars, and coffee shops – influenced by, among other things, the smash US TV hit *Friends*, where the central characters are often to be found occupying the comfortable chairs and sofas of ***Central Perk***, and the ***expansion of Starbucks*** – the current version of PE-lined coffee cups ensured drinks could be enjoyed on-the-go, offering convenience and keeping consumers safe from spillages etc.

However, in the mid-2010s, environmentalists noted how these cups were difficult to recycle, with most ending up in landfill, and others littering towns and the countryside, causing problems as the cups take centuries to decompose due to the plastic lining.

After Hugh Fernley-Whittingstall highlighted the problem, it triggered the UK Parliament to hold a review ***about the waste from single-use cups***. They estimated that 2.5 billion cups are sent to landfill each year in the UK.

Over the last few years, many big brand coffee chains started to take steps to reduce the number of single-use cups they offered, including encouraging customers to use reusable cups, or take part in cup return schemes. Inventors and innovators started to pitch possible replacements, with (industrial) compostable cups, triple-lined paper cups, and even edible cups suggested as possible replacements to the much-maligned single-use containers.

But such initiatives stalled when the Covid-19 pandemic appeared on the scene. When coffee shops reopened after lockdown, single-use cups were the only options available to customers – despite scientific research proving that there was ***no risk of transmission of the virus through the use of reusable cups***.

FINDING SUSTAINABLE SOLUTIONS

If reusable containers are to continue to be sold, then there must be ways of preventing the excess waste and pollution.

I visited a paper mill in the Lake District who process and recycle used PE-lined single-use coffee cups. The company receive in-store waste from large coffee brands based in the UK, as the virgin paper-board used in cups is of high value for them, and they are able to produce quality goods for clients, including greetings cards, high-end packaging for exclusive retailers, and notebooks. They created a process that separates the PE-lining, which is incinerated in a waste-for-energy process, although this also has potential negative environmental consequences.

This solution can deal with PE-lined single-use cups, but any innovations that do not use virgin paper-board, or which use other plastic-based materials, cannot be processed due to the threat to the environment from resultant microplastics. Additionally, the process only deals with waste collected in-store – clearly when people buy their coffee to takeaway, the cup is unlikely to be returned to the store, and most still end up in litter bins, collected by local authorities and destined for landfill.

NEW INFRASTRUCTURES

So what infrastructures are required? Any new innovation needs to have the correct pathway for cups when they have finished their life with the customer.

Here at Lancaster, we have bins specifically for PE-lined coffee cups, but what happens when these bins are contaminated with other waste, or with non-PE lined cups that cannot follow a route for recycling? Whose responsibility is it? Clearly, any new innovation requires a network to be set up to collect the waste, but in doing so, a dismantling of different networks is required, and when economic interests are in place, there will be resistance.

When the Chemistry work succeeds, and a material is produced to replace PE-lining, then what infrastructures does this require, what expectations of human behaviour are assumed, and who will resist such innovation? To build an innovation into an already established network demands a process of exnovation – a concept for studying the withdrawal of unsustainable technologies or materials.

My recent analysis explored disassociations and resistance to disassociation when attempting to engineer an absence, whether materially or symbolically. The study revealed a couple of major points. Firstly, innovation does not guarantee success without disrupting already established actor-networks. Secondly, design needs to factor in unexpected human behaviours when considering the end-of-life for the product. Where infrastructure is in place, assumptions that people will be disciplined in how they dispose of their waste cannot be relied upon.

The single-use coffee cup has become a ubiquitous daily item for many people in society, symbolising how busy, cool and important we are. For a device that is used, on average, for only 13 minutes, it is easy to see how the waste has become problematic by the sheer numbers sold.

Recycling is possible, so the next time you buy a coffee in a single-use cup, ask the retailer what is the best way of disposing when you have finished your drink.

Colin Hill is a PhD researcher in the Department of Organisation, Work and Technology.

His PhD is part of the Material Social Futures (MSF) programme, funded by The Leverhulme Trust.

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Skills for net zero in Lancashire

If the UK Government is to achieve its Net Zero 2050 targets, then all regions will have to play their part. The Work Foundation's *Trinley Walker* explains what needs to happen for Lancashire – home of Lancaster University and diverse clean energy infrastructure – to develop a workforce capable of delivering on the challenge.

World leaders assembled in Glasgow in the autumn for the Conference of the Parties 26 (COP26), aiming to forge a global consensus and plan of action to combat climate change. The UK Government has set out its own target: to drive a significant reduction in overall emissions and offset those that remain to achieve a net effect of zero emissions by 2050.

Lancashire is a place of strategic significance for net zero 2050. It is host to a range of infrastructure that supports clean energy, including offshore wind and nuclear energy. But organisations will need well-skilled labour if they are to maximise the opportunities presented by the county's cluster of clean growth industries.

SIGNIFICANT SKILLS GAPS

Net zero 2050 will have seismic implications for the labour market. A large majority of jobs, to a greater or lesser extent, will evolve as employers align their activity with net-zero ambitions, while new green jobs will be created as employers move away from carbon-intensive activities, putting some workers at risk. ***Work Foundation research conducted in partnership with the Lancashire Enterprise Partnership*** explored the skills needs of Lancashire businesses at the forefront of net-zero activity.

Our research included an online survey of low-carbon businesses in Lancashire, further in-depth interviews with survey respondents, and roundtable discussions with key sector stakeholders.

The key findings included:

- 47% of businesses surveyed find it difficult to recruit staff with the skills they need
- Almost a third find it hard to recruit for specialist skills
- Skilled trades roles are difficult to source

Businesses reported difficulty in recruiting for a range of specialist skills including: advanced engineering, digital technology and the digitalisation of manufacturing.

It is perhaps unsurprising that companies engaged in the delivery of advanced technologies require specialist skills. This points to a need for recruitment activity to branch out to potential candidates across a broad range of sectors host to workers with such specialist skills – especially those expected to decline through the transition to net zero.

However, more generalist skilled trade roles are also challenging recruitment propositions for Lancashire businesses. Construction and manufacturing are pivotal for the transition. The construction industry will need to rapidly ramp up activity to retrofit and insulate housing, but Lancashire construction firms reported concerns they may struggle to recruit the required staff needed. A company involved in retrofitting social housing reported that attracting young people into the industry is a real challenge. They have established an apprenticeship scheme for skilled trades such as plumbing, roofing and plastering, but are concerned they won't be able to fill the 40 positions available. There is a need to demonstrate the career pathways available within low-carbon businesses to attract young people weighing up their initial steps into the world of work.

SKILLS GAPS CONSTRAIN GROWTH PLANS

Our survey found that skills shortages are causing wider challenges for low-carbon businesses, including: an increased workload for other staff; delays in developing new products or services; and increased operating costs.

There is a real risk that skills gaps will limit activity that can secure a net-zero future for Lancashire.

We found that low-carbon businesses are investing time and resource in internal training programmes to meet demand for skills This may suggest the training available locally isn't meeting their needs. Of the 81% of businesses who are delivering their own training, the most common reason for doing so was to obtain skills not available through external provision.

To some extent this is expected; some low-carbon businesses have highly niche and technical skills requirements. For example, a specialist onshore wind company that participated in the research reported that the sector is quite fragmented, which can cause additional challenges in recruiting for highly specialist skills. Wind energy production involves various sub-sectors, from small-scale onshore wind to large-scale and commercial offshore wind, which require different skill sets.

Furthermore, each model of wind turbine is different, so the business requires highly-specialised in-house training according to the range of models used. This is time-consuming and expensive, as staff typically work off-site. This degree of specialism points to a necessity for the skills needs of low-carbon businesses to be amplified within local skills systems, among stakeholders, to ensure they are incorporated within provision. Government is reforming the skills system to give employers a more central role in the provision of technical ***education, as recent Work Foundation research*** explored. It is vital for low-carbon businesses to play a prominent role within emergent consultative processes within this reform agenda. Sector bodies, who enjoy close links with employers, will have an important role to play within this agenda.

RECOMMENDATIONS

So what steps are needed to better support low-carbon businesses in developing the skills base needed within their workforces in order to drive forward net zero ambitions? We set out a number of recommendations that, combined, hold the potential to catalyse a shift within the skills ecosystem that is better attuned to the needs of low-carbon firms:

- Sector bodies should undertake deep engagement with their members, through surveys, to ascertain the most pressing skills needs. Based on this evidence, partnerships between Colleges, Higher Education, private providers, and statutory bodies, should be developed to take forward provision for identified skills needs.
- With high-carbon jobs being lost, there is a need to facilitate transitions from adjacent sectors; workers from sectors such as oil and gas will hold skills relevant to the low-carbon sector.
- To facilitate internal succession planning, low-carbon businesses should engage with and inspire young people through local networks, such as Careers Hubs and Enterprise Adviser Networks, and which can support businesses to engage with inspiration and recruitment activities.
- Low-carbon businesses should develop entry level roles to attract younger workers as well as individuals from other sectors. These roles should be stepping stones to further opportunities in the sector, precursor positions to apprenticeships.

The UK Government has now launched a ***Net Zero Strategy*** which sets out the plans to meet the net zero 2050 target. The Green Jobs Taskforce recently published its ***report***, outlining the steps needed to reach Government's target of two million additional green jobs by 2030. The challenge of skills gaps was highlighted by the Taskforce and it is clear that more needs to be done to attract workers from a range of backgrounds in to low-carbon industries, to ensure the right opportunities for training and development are available to enable the industry to grow, and to deliver high-quality green jobs with good working practices and career prospects.

At the Work Foundation, we will continue to explore the challenges and opportunities that the shift to net zero will present for UK employers and workers over the year ahead.

Trinley Walker is a Policy Advisor with the ***Work Foundation***.

He is the author of ***Skills for Net-Zero in Lancashire: Building the low-carbon workforce of the future***, produced by the Work Foundation and the Lancashire Enterprise Partnership.

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SEEKING TRULY RESPONSIBLE INVESTMENT

Socially Responsible Investment and Abatement Markets have been hailed as helping to pressurise and encourage corporations to adopt green behaviours and reduce their negative impacts on the planet. *Dr Emre Tarim* argues that the solutions are too far embedded in the financial system – rewarding profits rather than environmental activity, words over actions – and there need to be major changes to make a real difference.

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In recent decades, the pressure on corporations to be environmentally responsible has grown exponentially. An increasing awareness of global environmental problems among investors and the population at large has been reflected by more companies pledging to do their part to save the planet.

The Intergovernmental Panel on Climate Change (IPCC) has ***warned governments*** that the world has only a decade or so to set global greenhouse gas emissions (GHGs) on a sharply-downward path, and more regulatory and market-based mechanisms are being devised.

From the introduction of environmental and social governance (ESG) reporting, to green investors making their voices heard at boardroom and shareholder levels, there are widespread initiatives to make a difference.

Under previous United Nations Framework Convention on Climate Change (UNFCCC) protocols, abatement markets have taken on a more prominent role. Moreover, those calling for more sustainable businesses have been urging corporations to take more responsibility towards alleviating the harms they generate.

But how much effect do these practices have? Can Socially Responsible Investment (SRI) or abatement markets, for example, encourage corporations to change their practices, when the drive the make a profit is still the most important factor?

This is a system that encourages a better financial future, but often at a cost to the environment, such as climate change or soil degradation. The future impact of a corporation's activities on the Earth System is irrelevant to its current value.

The problem with the above solutions is that they are heavily embedded in the system. Abatement markets and SRI try to deal with issues that extend beyond finance, but they are driven by financial metrics – profit, return on investment, and so forth.

SOCIALLY RESPONSIBLE INVESTMENT

SRI has its origins in the 1920s, when conscientious investors asked themselves 'why are we investing in the so-called "sin stocks", like tobacco, alcohol or arms producers, because they are clearly doing more harm than good?' In the 1970s and 1980s, they realised they needed to do something about corporations' environmental damage.

SRI is now part of a broader universe where you have ESG reporting evaluating companies' performance. ESG is conducted by a range of organisations who aim to hold corporations to account in the absence of a global public governance structure. Reporting provides companies with a source of procedural legitimacy, but adverse ESG outcomes keep them vulnerable to scandals, reputational ruin and economic harm.

SRI's share in total assets under management has expanded spectacularly as these systems have grown in popularity and application. In the USA, SRI funds grew from $640bn to $3tn between 1995 and 2011, quadrupling to $12tn by 2018 – 26% of all assets under management in the USA. In Europe between 2008 and 2018, the share of investments with an SRI aspect in their management jumped from 11% to 49%.

This might seem a success, yet the whole enterprise of SRI, as the name says, is for investment, and there are other problems.

While levels of SRI have increased, there are many markets, like bonds and bank loans, where SRI is not noticeable. Yes, there are green bonds, and maybe banks are promising not to finance fossil fuel companies, but those are just promises – financial underwriting for existing and new fossil fuel production projects has increased annually since the 2015 Paris Agreement.

And within ESG there can be a decoupling between reporting and reality – ***greenwashing*** – as corporations use a range of tactics to manage perceptions of their green credentials.

For financial accounting, there is only one standard and it is universally accepted. There might be slight differences globally, but you cannot get away with a scandal. Unfortunately, there are a proliferation of ESG rankings, and no set standards. Companies may be ranked differently by each of them, allowing them to pick and choose which to highlight and which to quietly ignore. Investors might realise that companies are doing something a bit dodgy by picking and choosing, but what can they do?

Even the rewards for ESG efforts often result from procedural efforts rather than actual carbon performance – a business can subscribe to the Global Reporting Initiative or the Carbon Disclosure Project without actually reducing its $C0^2$ output.

The SRI framework, despite its issues, can help change corporate behaviour. If ESG reporting and management standards succeed in denying funding and legitimacy to activities harming the environment, it will be all for the better. However, at present, it is hard to translate talking the talk to walking the walk.

ABATEMENT MARKETS

The same can be said for abatement markets, which commodify economic externalities – namely, unpriced outcomes of economic activity, such as CO2 emissions and have companies trade them in markets with an overall emissions cap. Compared to non-market solutions, such as taxation, abatement markets are thought to be a cheaper solution.

All participating companies have an allowance, and if you are polluting 100 tons and I am polluting 400 tons, you can sell your excess to me. You can still reduce your own pollution, and have a greater excess to can sell at a profit. This mechanism initially worked in terms of reducing emissions. The first applications were in the United States for pollutants that cause acid rain, and they were successful in reducing emissions by 40-50%.

But again there are issues. People like your company, because you will continue to reduce pollution, but people like me are lazy and do nothing, and we will continue to exist. The planet cannot wait for the market mechanism to reduce emissions by trading in this way.

In the last 20 years, the largest abatement market, the ***European Union's Emissions Trading System*** (ETS) has had difficulties stabilising the price of carbon . The price of polluting crashed a few times, so for a long time it was cheap to pollute and not very profitable to reduce your emissions. As more countries have made dramatic pledges to cut emissions, and energy prices have soared owing to Covid-19 related dynamics, the price of carbon has increased. While this is welcome news from an environmental point-of-view, European politicians are already calling for price caps over national economic and global competitive concerns.

The brief history of the ETS tells us that when left to the vagaries of market mechanisms, carbon prices can become too cheap or too expensive, both of which do not bode well for a sustainable and timely transition to a low carbon economy. The transition agenda should come from a broad political, economic, and societal consensus applied through market and non-market mechanisms. Market mechanisms, including abatement markets, are too embedded in a predominantly profit-driven system that has long ignored what is happening with the environment. A market designed to make it cheaper to reduce emissions might thus actually make reducing emissions unnecessary.

IN NEED OF A NEW SOLUTION

Both abatement markets and SRI have gained institutional ground despite falling short in reversing adverse environmental effects. They will gain more momentum and take on a broader scope in the coming decades, yet they are embedded in a system that prioritises economic and financial returns.

Our economic system can be reprogrammed through a new consensus about our future and that of the Earth System, which is no easy feat. Yet, we should have faith in our political systems to address the issues as much as we have in the markets.

A key step will be a more effective incorporation of Earth System realities into the dominant economic theories and practises. A good place to start is our own institutions, where we educate current and future finance practitioners.

If and when the financial system starts processing Earth System realities properly, there will be a real, across the board incentive for businesses to create a plan, and the decarbonisation of the economy will be more effective despite being market-driven.

Dr Emre Tarim is a Lecturer in Behavioural Sciences in the Department of Marketing.

This article is based on ***Modern finance theory and practice in the Anthropocene***, published in New Political Economy.

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The importance of engaging

For researchers to engage with those affected by their outcomes, we must involve key stakeholders from the start. Yet those with the greatest stake often have little real influence. ***Professor Katy Mason*** and ***Dr Sharon Wagg*** explain how their work on ***Mobile Access North Yorkshire (MANY)***, a Department for Digital, Culture, Media and Sport (DCMS) 5G testbed and trial initiative, put the local community at the heart of the huge infrastructure project, ensuring voices were heard and opinions were acted on, and setting an example for future infrastructure programmes.

Burton cum Walden, Leyburn, UK

The picturesque countryside west of the small market town of Leyburn, on the north-eastern fringes of the Yorkshire Dales National Park, is dotted with villages and hamlets you pass through in the blink of an eye. Surrounded by fields and dry-stone walls, with more sheep than people; this is the idyll of rural England.

Driving through meandering lanes, or walking the country trails, it is easy to lose your bearings. For those who do, that modern bastion of navigation, the patron saint of geographically lost souls – the mobile phone – is no help. As 3G and 4G have swept the world, here in the isolated hills and valleys of Coverdale, Wensleydale and Swaledale, connecting to a mobile network can never be taken for granted.

For some this is a blessing. They live in the area precisely because they want to get away from it all, to disconnect from the mainstream and enjoy a slower-paced existence. There are those, too, who holiday here to switch off, happily unable to check their emails while relaxing in front of a roaring log fire in the local hostelry.

Then there are those for whom the lack of access is a hindrance: businesses unable to operate at peak capacity; home-workers struggling to connect with their organisations; holiday-makers who hand back the keys to the cottage because there is no Wi-Fi.

Into this environment, the UK Government Department for Digital, Culture, Media and Sport (DCMS) launched the 5G testbed and trial initiative Mobile Access North Yorkshire (MANY). MANY aims to help rural communities achieve socio-economic flourishing through improved connectivity and provide a platform for improved wellbeing, business innovation, and safety and resilience.

The MANY consortium works with the community in two ways.

Firstly, MANY develops use cases for new technology that will sit on the new connectivity infrastructure. Specific cases under development include a Tourism Augmented Reality experience, Environmental Monitoring – providing early flood warnings, Wellbeing and Mental Health support, and Mission-Critical Communications for mountain rescue teams.

Secondly, MANY works with community members more broadly to understand connectivity experiences, aspirations and concerns, enabling us to build an understanding of the entanglement of home, work, business, community and connectivity technologies, and how rural communities value connectivity technologies socially and economically.

This is a commercial programme, looking to prove such a scheme is viable, but from the start there has been recognition that the people most affected – residents and businesses of this quiet region – need to be listened to.

Engagement can give people a voice, and occasionally enables projects to act on that voice. But our experience is that this action does not happen very often in similar large-scale infrastructure projects. Our role has been to ensure engagement happens, and goes beyond transmitting and explaining project benefits, to ensure community wishes are heeded. Our research provided privileged insight into the community, giving a real sense of the space and its people.

DO NO HARM

There are often assumptions within research projects. You say 'this is the work we will do; this is when and how we will do it'. What became clear from MANY is that level of certainty is not always possible or practical. We had to adapt and develop to suit the situation, to take account of the problems and concerns local people raised about the new connectivity infrastructure.

You stand to damage a community if you say outright 'we're doing this and this'. You have to be sensitive to what works and what hurts, to listen to the different voices, concerns and aspirations. You can easily expose or create rifts if you do not handle the situation sensitively; it goes back to the essence of research ethics – do no harm.

If you can say to the community 'this is what we hope to do, this is who we have listened to, and this is the evidence of community concerns and aspirations', and if you communicate in an accessible way, you can start to improve the transparency of a difficult and complex, community-based project. Then, even if people don't like the project goals, at least they have a clearer understanding of what is happening and why. Communities are generally more accepting as a result. This doesn't mean local opponents suddenly disappear – some still felt strongly they did not want 5G – but there was a growing realisation that more people were positive about the project and needed these technologies for connectivity.

We were able to identify what really matters to a community – not just individuals. We could say to project partners 'this really matters' and get the project to change where they put masts, for example, or tell them when more information was needed, because we had a body of evidence.

5G involves all the technologies – the software, the hardware, the stuff that is contentious, the stuff already in use. People can become fixated on one tiny part of the infrastructure: small cell was thought by some to be dangerous. Some community members argued there was no evidence to show 5G small cell definitely isn't dangerous (though it is approved by government regulators). There are confusing messages out there. For example, 5G small cell uses ionising rays, which at a certain frequency are dangerous. But the frequency deployed in connectivity technology is not dangerous – and MANY did not use that particular technology anyway. But these messages are conflated and it is difficult for communities to understand what is safe and what is not. This concern drew attention away from the project's environmental sustainability and energy efficiency savings, compared to older technologies.

It was important to translate what we heard from the community for the project's technical team. We refused to accept the 'they're anti-5G' argument. We worked hard to ensure concerns and questions were heard. Part of our purpose was to give people the space where those questions could be aired, listened to and answered. This made our project different from other testbed projects.

NOT CHANGING MINDS

Our job wasn't to convince people we were right, it was to listen, to understand what people were telling us, and to pass it on to the right people in the right way. For the commercial partners, it was perhaps in their interest to change the minds of people in the community, but that was not our job – we weren't making judgements, we were just listening and acting as a bridge between the different project stakeholders and the community, helping them understand each other.

We did introduce experts and champions, who would come and speak to the community, to try to explain the technology. I don't think we changed anybody's mind from being anti-5G, but we provided information to people who wanted to understand more and move beyond 5G myths and rumours.
We helped make difficult technical information more accessible, so people could consider and further explore their views.

One community member was a retired scientist who felt strongly the area did not need 5G. They expressed their view that we were pro-5G and just presenting a case on behalf of MANY, but that was never our position. We still don't believe a community that does not want 5G should have it imposed on them. MANY has held this position from the beginning – if this community, outright, tells us no, then we won't put the 5G connectivity infrastructure in place.

STILL NOT PERFECT

We still see an issue with the set-up of this type of project. The project was DCMS-funded, and the lead on the project was a commercial company, who want to see if they can develop the tech, put it together, and deliver connectivity services at a commercial rate. One community member said: 'You've already decided. You're going to put this in anyway. So why are you bothering speaking to us?' This is an important observation. Once DCMS signed a contract with the MANY partners, the money was there, and the project team were committed to installing trial connectivity technologies somewhere. At the same time, MANY was committed to not forcing these technologies on people who didn't want them, despite the contractual obligations. This created significant tensions. The solution to the problem is to move the research with communities to before the point of contract signing.

With projects looking at contested infrastructure, research needs to take place before money is allocated, so that project teams have evidence of community demand before work starts. We learnt a lot from engaging with communities. We have developed a useful toolkit to help future projects plan engagement activities and use the voice of the community to shape what they deliver. We learnt the importance of inclusivity, developing peripheral vision, and the need to use a variety of mechanisms and methods to connect people across the different project elements, to encourage knowledge exchange and sustain dynamic information flows so that the community voices reach all parts of the project. As to the lasting sustainability of the project, only time will tell.

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Mobile Access North Yorkshire (MANY) is a £6.5m project funded by the UK Government Department for Digital, Culture, Media and Sport (DCMS) a 5G testbed and trial initiative developing a 5G digital economy infrastructure in North Yorkshire. Partners include Quickline Communications, a mix of specialist SMEs and the University of York, as well as researchers in Lancaster University Management School (LUMS) and Lancaster's School of Computing and Communications (SCC).

A research output from the MANY project includes a community-engagement toolkit recommended for use on complex projects in place.

BEYOND THE STEREOTYPES

Since the mid-1990s, the term NEET has been used to cover a category of young people who are out of employment, education or training, and its connotations have not been positive. *Dr Beth Suttill* spent time meeting and listening to young people who come under the banner, and found a far more diverse group, with different lives and experiences, than the label would have you believe.

The chances are, if you have come across the term NEET, the context was not positive.

Referring to young people not in education, employment or training, for 25 years NEET has been used to refer to those seen as having few skills, little drive and limited prospects.

In the media and government policy since the new Labour government looked to tackle youth unemployment under the term, NEET conjures an image of teens in hoodies hanging around tower blocks, possibly involved in crime, maybe gang members, certainly without a bright future.

Policy says only that those who are NEET are either unemployed or economically inactive, and it now covers those aged 16 to 24, reflecting growing concerns over graduate employment.

For most young people, being NEET is a transitory phase. It is not an inclusive definition, but one of exclusion: NEETs are 'not in education', 'not in employment' and 'not in training' – they are seen as being outside the norm and in need of policy intervention. Though a heterogeneous group, they are stereotyped by policymakers, by society, as 'other', disadvantaged, or 'on the margins'.

My research speaking to young people at a 'lifeskills' centre for young people who are NEET in Central England aims to give them a voice, the chance to challenge the stereotypes and to show their diversity, their individuality. Labelling them as a single homogeneous category is difficult.

Those I spoke to did not seek to group themselves together with uniform characteristics, instead they highlighted individual deficiencies when discussing their unemployment. They recognised the stereotypes of being young and unemployed – if not the term NEET itself – but tried to distance themselves from them, emphasising their 'student' status. They were keen to show they were doing something with their lives, that they are 'ordinary' young people, but with differing experiences of unemployment and education, and with challenges in their lives.

THE IMPACT OF STEREOTYPING

Negative stereotyping around young people who are NEET can lead to stigmatisation, demonisation and exclusion. They are seen as having deficits, such as a lack of skills or motivation, and as being a problem needing help.

Media portrayals highlight worries they are 'unfit' for work; that they lack aspiration and 'the right skills'; that they are not 'work ready' and are instead a 'risk' to employers. Being NEET is also associated with being lower attaining, with being 'practical' rather than 'academic'. They tend to be treated as a group who would benefit from basic skills, and the focus is on improving employability.

As well as low educational attainment, homelessness, teenage pregnancy and care needs, the NEET label has been associated with gang membership, early criminalisation, drug culture and dependency, and prostitution.

This stigmatisation leaves the young people affected feeling they are on the margins of their communities.

WHO ARE THEY?

It is essential to understand those categorised as NEETs from their own individual perspectives. I went beyond the stereotypes to explore how these young people define themselves and their situation, to explore the misconceptions and underlying assumptions, focusing on who they are rather than rendering them invisible within the homogeneous 'uneducable and unemployable' mass.

I spoke to 27 young people aged between 16 and 24 who were attending a centre where they undertake qualifications in Mathematics, English, Information Communication Technology, and Digital Arts and Media; complete a week of work experience; and get help with job searching and interview skills.

They are well aware of the stereotypes that surround them for being young and unemployed – though none of them knew what NEET meant. But being unemployed was not central to them; they defined themselves instead through their personal characteristics, their relationships with others, their interests and hobbies. Those who saw themselves as 'different' did so not because of their unemployment, nor because they saw themselves as disadvantaged, but because they saw their interests as being at odds with the mainstream. This was not negative, more linked to the idea of being unique.

They did not reject the stereotypes related with NEET, but rather sought to distance themselves from them, identifying individual deficiencies as the reasons for their unemployment, alongside an acknowledgement of the barriers they faced.

They were viewed as disengaged learners, but wider issues impacted their education. One participant had been in a serious car accident during his final year of school, one had been kicked out due to anger issues, and another was not allowed to finish college when she became pregnant.

Some were 'on the dole' and 'feeling lost'; unemployment felt like a personal failure– being 'on benefits' was associated with feelings of shame and embarrassment – and they focused on individual shortcomings, such as a lack of experience or qualifications. Low confidence and self-esteem were common. One of the aims of the centre is to build confidence, and the participants felt this had happened, but only temporarily – the feeling disappears outside the confines of the programme. There was frustration among them that they were just being moved from one course to the next, unable to find a job in spite of their training, leading them to question the point of it all.

Some felt discriminated against; one told me their age made them 'unemployable', and there was an overall feeling that employers do not give young people an opportunity.

They also highlighted the economic barriers they faced – they needed money to get a job, but needed a job to get money – as well as issues related to physical and mental health. There were students with depression and anxiety, attention deficit hyperactivity disorder, schizophrenia, cerebral palsy and epilepsy – everyone had their own issues and obstacles to overcome.

TAKE A DIFFERENT APPROACH

These are 'ordinary' young people, labelled as different and set apart due to their experience of being outside employment, education or training. They are a varied and diverse group, who have been stereotyped and blamed for their situation, ignoring wider social issues and other aspects of their lives.

Interventions aimed at NEET young people aim to increase confidence, yet can lead to a focus on weaknesses and deficiencies. They do little to move them towards meaningful employment, and young people can become trapped in a cycle of training with no end result.

Instead, they need diverse, quality programmes and individualised long-term support. They do not just need access to education and training, they need for that provision to have a level of quality.

The focus should not be on the NEET status of these young people, but rather on understanding them and targeting support that takes their situations and difficulties into account. Unemployment might not be the most immediate risk they face – there may be other problems they need to overcome first before moving into education, training or work. The focus should not be purely on reducing jobless figures, but on meeting the needs of young people in a purposeful way.

Dr Beth Suttill is a Teaching Fellow in Management and Organisation Studies in the Department of Organisation, Work and Technology. Her current research interests are based around youth transitions, unemployment and identity.

The paper ***Non-academic, lazy and not employable: Exploring stereotypes of NEETs in England*** is published in EAWOP in Practice.

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CASTE ADRIFT

The caste system in India has shaped society for 3,000 years. In centuries past, members of low castes – then seen as untouchables – suffered greatly in their life prospects. *Dr Saurabh Singhal's* research shows that while there have been attempts to end discrimination and prejudice, there are deeply ingrained attitudes and traits which mean, even today, low caste members face enormous personal hurdles on their way to educational and employment success.

The caste system in India has operated for millennia. The system divided Hindus into rigid hierarchical groups, with segregation between higher and lower castes, privileges for those at the top, and the repression of those at the bottom.

From the 18th Century onwards, when Britain established colonial rule, castes became a defining feature of Indian life. Caste is intrinsically linked to an individual's social and economic outcomes. The lower castes – Scheduled Castes, former untouchables – and indigenous tribes – Scheduled Tribes – have fared much worse than upper castes in terms of educational and occupational achievement, wages and consumption, and business ownership.

It was only in 1950, when independent India produced its constitution, that discrimination on the basis of caste was banned. Affirmative action was implemented for SCSTs (Scheduled Castes and Scheduled Tribes – who made up a quarter of the population in the 2011 census) and Other Backward Classes (OBCs) – estimated at 41% of the population by the National Sample Survey Organisation – in the form of quotas in national and state legislatures, local government, higher education, and government jobs. This has had a positive impact on poverty reduction and educational attainment, but significant gaps remain, and SCSTs continue to be subjected to violence by upper castes.

The stigma associated with being lower caste means individuals are not viewed on their own merits, but through a stigmatised caste lens. Such social exclusion and discrimination can likely affect a person's beliefs, perceptions and aspirations.

This is not an issue confined to India. Hierarchies in social identities have been found to be integrally related to divergences in economic status around the world. On average, historically marginalised and discriminated groups perform worse on typical indicators of achievement compared to those from higher-ranking social groups. This applies across race, ethnicity, religion and gender.

Where there is a large social divide, adherence to choices that confirm identity stereotypes can influence and restrict the choices of minority groups. This creates a vicious cycle where poor self-valuations due to the internalisation of negative stereotypes result in the perpetuation of adverse outcomes.

BARRIERS TO SUCCESS

Recent research has shown that labour market outcomes are not just explained by differences in cognitive skills, but also influenced by socioemotional traits. The internalisation of negative self-images has the potential to detrimentally influence exactly such characteristics.

In ***our study*** of around 2,000 students at the University of Delhi – which reserves 15% and 7.5% of seats for SC and ST applicants respectively, and 27% for OBC students – both SCST and OBC students fare worse than the upper caste students along several dimensions of economic behaviour and personality traits. This lower self-evaluation can have important implications for their academic and labour market success.

Our results reveal the depth of cumulative effects of years of discrimination along caste lines. Students in the lower caste groups not only express lower willingness to compete and less confidence, but they score lower on grittiness – the ability to pursue long-term goals with sustained effort – locus of control – the belief that life events are more under their control than determined by luck and other factors – conscientiousness, extraversion, agreeableness, and openness to experience.

These outcomes have meaningful implications. For instance, competitiveness can explain gender gaps in academic track choice, job entry decisions, and wages; and those with an internal locus of control perceive the subjective returns on effort and investment to be higher – explaining the positive relationship between locus of control and investments in education, job search, and health behaviours.

Given the importance of such traits such in explaining labour market performance, the wage and occupational disadvantage faced by SCSTs could be magnified due to lower ratings.

SEEKING SOLUTIONSS

Our results show that SCSTs and OBCs are at a disadvantage when it comes to behavioural preferences and ratings on personality traits, and they continue to suffer from historical and cultural discrimination.

Children from minority groups are deprived not just because of their poorer socioeconomic status, but also because they grow up in environments characterised by low parental capital and a lack of social support. Our results show that a higher socioeconomic has some compensatory effects for low castes, but only for a small subset of personality traits.

Likewise, attending a private school before joining university has some compensatory effect on certain personality traits. SCSTs who attended private school are more emotionally stable and agreeable than those who did not, while privately schooled OBCs are more conscientious and open to experience. The results suggest that access to better environments in private schools could potentially foster a healthier development of some personality traits among low caste groups.

But parental investment in education is not enough. A very large improvement in wealth status would be needed to overcome some of the negative self-perceptions lower caste members have. Instead, there needs to be an urgent redesign of affirmative action policies, focused at a younger age, to mitigate the long-term consequences we observe of being born into a lower-caste family.

Given that racial gaps in cognitive and socioemotional skills emerge even before children reach school-going age, and tend to persist thereafter, there is a compelling case for targeting early childhood interventions for children from disadvantaged backgrounds. It is important to follow these investments in later ages to reap the benefits.

Currently, the earliest members of low castes can benefit from affirmative action is when they enter higher education or public sector employment, by which point it may be too late. There is an urgent need to invest in programmes that directly target the development of soft skills during childhood and adolescence.

Beyond this policy action, there is the need to foster greater inter-caste contact to help reduce biases and negative stereotypes which have repercussions for self-confidence and self-esteem among low castes.

Improvements have been made in recent decades, and there is evidence of significant catch-up experienced by SCSTs in terms of occupation, wages, consumption, and education. But more must be done to eliminate lingering prejudice and discrimination, and to assist lower caste children in their development to give them a greater chance of educational and employment success later in life.

Dr Saurabh Singhal is is a Senior Lecturer in the Department of Economics, with a research interest in the political economy of development, human capital development issues and experimental economics.

This article is based on the IZA Institute of Labour Economics discussion paper ***Social Identity, Behaviour, and Personality: Evidence from India***, by Associate Professor Utteeyo Dasgupta and Associate Professor Subha Mani, of Fordham University; Dr Smriti Sharma, of Newcastle University Business School; and Dr Saurabh Singhal, of Lancaster University Management School.

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