

The Future of Food Symposium

2021 PROCEEDINGS

‘The Future of Food Symposium 2021: from
Recovery to Resilience’

Coventry University, Centre for Business in
Society (CBiS)

8th -9th September, 2021

Research Centre
Business in Society

Coventry
University 

CONTENTS

Forward by the symposium committee
Agenda
An introduction to Centre for Business in Society (CBiS)
Key note speakers
Panel debate descriptions and speaker biographies
What enabled and constrained community food groups during the Pandemic?
Logos and Logistics: The challenges and opportunities of certifying food production to promote sustainable consumption
Mandatory food waste Reporting for Businesses: Opportunities, Challenges and Implications
TRACK A - The Evolving Crisis of food waste from farm to fork
Consumers' perception of smart labels: A situated approach
Planning to waste? Addressing household food waste through resolving the practice of food planning
Consumer edibility perceptions: The edibility threshold
Hospitality food waste: Influencing others to prevent food
Identifying New Product Opportunities from Waste: Eliminating Waste in Tomato Production
TRACK B - Key issues, challenges and solutions to food and nutrition insecurity
Are nutritious diets affordable to people from various states of India? An exploratory study
Innovation and change in the provision of emergency food aid during the pandemic
Feeding the People in Wartime Britain: lessons for contemporary food policy
TRACK C - Digital platforms as sustainable food solutions
Barriers and Challenges from food waste reducing platforms: the Brazilian case
Co-creating value from failed experiences in the sharing economy

SHARE-IT: Barriers and opportunities for reporting on the sustainability impacts of food sharing initiatives

Which categories should supermarkets upload on food waste reducing digital platforms?

The Role of Digital Platform in Waste Recovery in the Food Supply Chain

[TRACK D - Alternative experiences of producing, consuming and eating](#)

Healing Precarity in Food Systems: CSAs, Covid-19 and Complexity

Britain's World War II food policies — their planning, implementation, and results — and lessons that could help us transform today's food systems to be sustainable and just

The importance of small-scale farming and alternative food alliances for promoting resilient futures post-COVID-19 crisis in Brazil

Conceptualising diversity in food systems

[TRACK E - Sustainable Sourcing and ethical consumption](#)

Where now? A critique of pandemic consumer, business and government behaviours in relation to food in the UK

Shifting the Dial for Workers: Developing and Implementing a new Standard for Ethical Trade and Responsible Sourcing

Drivers and barriers for poultry consumption in India

The Sustainability of Beef Supply Chain with RAPBEEF

Edible, Sustainable and Ethical Insects: Devising an Export Roadmap from Thailand to Europe

[TRACK F - Decision making in Food Supply Chains: Transitioning to a circular economy](#)

Green food supply chain optimization using multi-objective mathematical modelling and simulation-based optimization.

Decision Making for Resilient food supply chain using operations research; a survey.

Circular economy of spent coffee ground as oyster mushroom cultivation: Urban agriculture strategic

A review on models and analysis methods of decision making in food supply chains.

Development of Red Seaweed Carrageenophytes-based Biopolymers as Sustainable Food Packaging Materials.

Scenario-Based Simulation Optimization of Food Production System Considering Bottlenecks and Preventive Maintenance Case Study: A Tomato Paste Factory.

FORWARD

The wide reaching impact of COVID-19 has reframed sustainability challenges. New problems have emerged at the same time as exacerbating existing issues. Levels of global consumption and production remain unsustainable and require urgent changes to meet emission reduction targets.

Food remains at the centre of a sustainable transition. Its future is critical to the livelihood and wellbeing of people and planet. We put forward the Future of Food Symposium as an opportunity to not only share insight into the impact of the pandemic, and timely research linked to the topic of food, but as a space to discuss, depict and devise the road to recovery and beyond. At the centre of the future of food is a need for a transition to more resilient pathways. To reframe, adapt and pursue more sustainable practices across society.

Following the success of the inaugural symposium at the University of Nottingham in 2019, this year the Centre for Business in Society at Coventry University host the symposium online. We invite stakeholders across business and society to present, discuss, debate and collaborate in moving forward the sustainable food agenda. Paper presentations and panel discussions will be given by leading thinkers within academia, industry, the charitable sector and grassroots movements to prompt valuable discussion. We invite presenters and participants to join virtually.

The Future of Food Symposium 2021 committee:

- Dr. Jordon Lazell (*Research Assistant, Centre for Business in Society, Coventry University and Co-founder of the International Food Loss and Food Waste Studies Group*)
- Marsha Smith (*Founder of the Nottingham Social Eating Network, and Doctoral Researcher, Coventry University*)
- Dr. David Bek (*Associate Professor, Centre for Business in Society, Coventry University*)
- Dr. John Harvey (*Assistant Professor in Marketing, N/Lab, University of Nottingham*)

Track and panel chairs:

Dr. Annesha Makhal, Dr. Katrien Steenmans, Dr. Lopa Saxena, Dr. Shantanu Mullick, Dr. Luke Owen, Dr. Adrian Evans, Dr. Jill Timms, Dr. Mahdi Bashiri, and Professor Benny Tjahjono.

PGR Organisers:

Sylvia Uche, Hillary Chindodo, Joshua Rees and Lahandi Baskoro.

Administration team:

Garzala Farid, Debbie McArdle, Rosie Gibbard and Kate Pope.

AGENDA

Website:

<http://futurefoodsymposium.uk/>

Registration link:

<https://www.eventsforce.net/cugroup/363/home>

Day 1 – Wednesday 8th September

	Zoom link 1 - https://coventry-ac-uk.zoom.us/j/81334067252 Passcode: 6#7*3%#&
9.00 to 9.15am	Opening and symposium handover Jordon Lazell, Marsha Smith and David Bek, Centre for Business in Society, Coventry University John Harvey, N-Lab, University of Nottingham
9.15 to 9.30am	Opening speech Zarah Sultana, MP for Coventry South
9.30 to 10.00am	Keynote Professor Anna Davies, Trinity College Dublin <i>“A manifesto for sustainable food sharing futures”</i>
10.00 to 10.30am	Keynote Jamie Crummie, Co-founder of Too Good To Go
10.30 to 10.40am	<i>Comfort break</i>

	Zoom link 1 - https://coventry-ac-uk.zoom.us/s/81334067252 Passcode: 6#7*3%#&	Zoom link 2 - https://coventry-ac-uk.zoom.us/s/87921517503 Passcode: =630*+42
10.40 to 12.40	<p><u>Track A Paper presentations:</u> <i>The Evolving Crisis of food waste from farm to fork</i></p> <ul style="list-style-type: none"> a) Consumers' perception of smart labels: A situated-approach. <i>(Barone, A.D. and Aschemann-Witzel, J. Aarhus University and Goldsmiths, University of London)</i> b) Planning to waste? Addressing household food waste through resolving the practice of food planning. <i>(Lazell, J. Coventry University)</i> c) Consumer edibility perceptions: The edibility threshold. <i>(Makhal, A. Coventry University)</i> d) Hospitality food waste: Influencing others to prevent food waste. <i>(Pearson, N. University of Bath)</i> e) Identifying New Product Opportunities from Waste: Eliminating Waste in Tomato Production. <i>(Salgado, D. and Simms, C. University of Portsmouth)</i> 	<p><u>Track B Paper Presentations:</u> <i>Key issues, challenges and solutions to food and nutrition insecurity</i></p> <ul style="list-style-type: none"> a) Are nutritious diets affordable to people from various states of India? An exploratory study. <i>(Chandorkar, S., Bahadkar, P. and Pareek, S. The Maharaja Sayajirao University of Baroda)</i> b) Innovation and change in the provision of emergency food aid during the pandemic. <i>(Mulrooney, H., Bhakta, D. and Ranta, R. Kingston University and London Metropolitan University)</i> c) Feeding the People in Wartime Britain: Lessons for contemporary food policy. <i>(Evans, B. Liverpool Hope University)</i>
12.40 to 1.15pm	<i>Comfort break</i>	

Zoom link 1 - https://coventry-ac-uk.zoom.us/j/81334067252 Passcode: 6#7*3%#&	
1.15 to 2.00pm	<p><u>Panel discussion:</u> <i>What enabled and constrained community food groups during the Pandemic?</i></p> <p>Speakers:</p> <ul style="list-style-type: none"> • Simone Connolly, <i>Director, Fareshare Midlands</i> • Louise Delmege, <i>National Food Service, Bristol</i> • Hannah Gallimore, <i>Central England Co-op</i> • Megan Blake, <i>Sheffield University</i> • Ellie House, <i>Chief Operating Officer, Foleshill Community Centre, Coventry</i>
2.00 to 2.10pm	<i>Comfort break</i>
2.10 to 4.10pm	<p><u>Track C Paper presentations:</u> <i>Digital platforms as sustainable food solutions</i></p> <ol style="list-style-type: none"> a) Barriers and Challenges from food waste reducing platforms: the Brazilian case. (<i>De Almeida Oroski, F. and Fujimoto, M. Federal University of Rio de Janeiro</i>) b) Cocreating value from failed experiences in the sharing economy. (<i>Ljevar, V., Nica-Avram, G., Harvey, J., Branco-Illodo, I., Gallage, S. and Goulding, J. University of Nottingham and University of Stirling</i>) c) SHARE-IT: Barriers and opportunities for reporting on the sustainability impacts of food sharing initiatives. (<i>McGeever, A. H. and Davies, A.R. Trinity College Dublin</i>) d) Which categories should supermarkets upload on food waste reducing digital platforms? (<i>Mullick, S., Raassens, N. and Rizky Nurman, M. Coventry University, UK and Eindhoven University of Technology</i>) e) The Role of Digital Platform in Waste Recovery in the Food Supply Chain. (<i>Tian, S. University of Nottingham</i>)

	<p>Zoom link 1 - https://coventry-ac-uk.zoom.us/j/81334067252 Passcode: 6#7*3%#&</p>
4.10 to 5.00pm	<p><u>Impact event:</u> <i>Fareshare fighting hunger and tackling food waste</i></p> <p><i>Speakers:</i></p> <ul style="list-style-type: none"> • Marsha Smith, Dr. Jordon Lazell and Dr. David Bek, <i>Centre for Business in Society, Coventry University</i> • Simone Connolly, <i>Director, Fareshare Midlands</i> • Hannah Gallimore, <i>Central England Co-op</i>
5.00 to 5.10pm	DAY 1 CLOSE

Day 2 – Thursday 9th September

	Zoom link 3 - https://coventry-ac-uk.zoom.us/j/86566043040 Passcode: 17^68?8%
9.00 to 9.15am	OPENING OF DAY 2
9.15 to 9.45am	Keynote Professor Moya Kneafsey, Coventry University <i>“Territorial Food Systems: a relevant concept for the future of food?”</i>
9.45 to 10.15am	Keynote Professor Suzanne Higgs, University of Birmingham <i>“How eating together affects consumption: implications for the future of food”</i>
10.15 to 10.30am	<i>Comfort break</i>

	Zoom link 3 - https://coventry-ac-uk.zoom.us/j/86566043040 Passcode: 17^68?8%	Zoom link 4 - https://coventry-ac-uk.zoom.us/j/88266547302 Passcode: .8?^!\$
10.30 to 12.30pm	<p><u>Track D Paper presentations:</u> <i>Alternative experiences of producing, consuming and eating</i></p> <ul style="list-style-type: none"> a) Healing Precarity in Food Systems: CSAs, Covid-19 and Complexity. <i>(Blake, L. and Chohan, J. University of Bristol)</i> b) Britain’s World War II food policies — their planning, implementation, and results — and lessons that could help us transform today’s food systems to be sustainable and just. <i>(Boyle, E. , Independent author)</i> c) The importance of small-scale farming and alternative food alliances for promoting resilient futures post-COVID-19 crisis in Brazil. <i>(Silva Machado, F. Federal University of Rio de Janeiro, Brazil)</i> d) Conceptualising diversity in food systems. <i>(Wahlen, S. and Mahr, B. University of Gießen)</i> 	<p><u>Track E Paper presentations:</u> <i>Sustainable Sourcing and ethical consumption</i></p> <ul style="list-style-type: none"> a) Where now? A critique of pandemic consumer, business and government behaviours in relation to food in the UK. <i>(Barnett-Richards, K., Timms, J., Quinn, L. and Bek, D. Coventry University)</i> b) Shifting the Dial for Workers: Developing and implementing a new Standard for Ethical Trade and Responsible Sourcing. <i>(Humphries, F. BRC-Global Standards)</i> c) Drivers and barriers for poultry consumption in India. <i>(Scudiero, L. and Tak, M. Royal Veterinary College, University of London)</i> d) The Sustainability of Beef Supply Chain with RAPBEEF. <i>(Susanty, A. Diponegoro University)</i> e) Edible, Sustainable and Ethical Insects: Devising an Export Roadmap from Thailand to Europe. <i>(Tiwasing, P., Siriamornpun, S. and Ferreria, J. Coventry University and Mahasarakham University)</i>
12.30 to 1.00pm	<i>Comfort break</i>	

	Zoom link 3 - https://coventry-ac-uk.zoom.us/j/86566043040 Passcode: 17^68?8%	Zoom link 4 - https://coventry-ac-uk.zoom.us/j/88266547302 Passcode: .8?\$^7!\$
1.00 to 1.45pm	<p><u>Panel Discussion:</u> <i>Logos and Logistics: The challenges and opportunities of certifying food production to promote sustainable consumption</i></p> <p>Speakers:</p> <ul style="list-style-type: none"> • Anna Barker, <i>Head of Commercial Partnerships at the Fairtrade Foundation</i> • Professor Alex Hughes, <i>Department of Geography, University of Newcastle</i> • Richard Griffiths, <i>Chief Executive of The British Poultry Council</i> • Professor Valerie Nelson, <i>Natural Resources Institute at University of Greenwich</i> • Kobus Pienaar, <i>Technical Manager for Food Security at Woolworths, South Africa</i> 	<p><u>Panel Discussion:</u> <i>Food Waste Reporting for Businesses: Opportunities, Challenges and Implications</i></p> <p>Speakers:</p> <ul style="list-style-type: none"> • Dr. Carrie Bradshaw, <i>University of Leeds</i> • Francesca Goodman-Smith, <i>Fight Food Waste CRC, Australia</i> • Martin Bowman, <i>Senior Policy & Campaigns Manager at Feedback</i>
1.45 to 2.00pm	<i>Comfort break</i>	

Zoom link 3 - https://coventry-ac-uk.zoom.us/s/86566043040 Passcode: 17^68?8%	
2.00 to 4.15pm	<p><u>Track F Paper presentations:</u> <i>Decision making in Food Supply Chains: Transitioning to a circular economy</i></p> <ul style="list-style-type: none"> a) Green food supply chain optimization using multi-objective mathematical modeling and simulation-based optimization, (Case study: Koorosh Protein Products Company). (<i>Babakhani, N., Sajadi, S.M. and Taghizadeh-Yazdi, M. University of Tehran and Coventry University</i>) b) Decision Making for Resilient food supply chain using operations research; a survey. (<i>Ghanbari, S. Shahed University</i>) c) Circular economy of spent coffee ground as oyster mushroom cultivation: Urban agriculture strategic (<i>Harsono, S. S. University of Jember</i>) d) A review on models and analysis methods of decision making in food supply chains. (<i>Khajeh, E. Coventry University</i>) e) Development of Red Seaweed Carrageenophytes-based Biopolymers as Sustainable Food Packaging Materials. (<i>Praseptianga, D. Universitas Sebelas Maret</i>) f) Scenario-Based Simulation Optimization of Food Production System Considering Bottlenecks and Preventive Maintenance Case Study: A Tomato Paste Factory. (<i>Sajadi, S.M., Mirzaesadr, M. and Salehi, F. Coventry University and Islamic Azad University</i>)
4.15 to 4.45pm	<p>Symposium closing</p> <ul style="list-style-type: none"> - Summary of each track and panel session - Call out for a host for The Future of Food Symposium 2022

An introduction to the Centre for Business in Society (CBiS)

The [Centre for Business in Society \(CBiS\)](#) is home to over thirty specialist researchers, a dedicated research support team, 100+ PhD researchers, many of the faculty's professoriate, staff who are currently undertaking their sabbaticals and a large designation of Associate Researchers. CBiS also oversees the faculty's professional doctorate programme, the DBA.

Through understanding the impact of organisations' activities, behaviours and policies, the centre's research seeks to promote responsibility and to change behaviours, in order to achieve better outcomes for economies and societies.

Interrogating the impact of organisations, the CBiS research teams are focusing on the circular economy, sustainability and ethical consumption; durable and inclusive economies; the socio-economic impacts of the financial crisis and financialisation on economies and the individual; and the implications of digital and big data for business, society, the economy and privacy.

Their traditional core interests in sustainability and economic development are now joined by teams exploring two of the biggest sources of business's impact on society in recent years: post-financialisation and the digital economy-fuelled explosion of data.

The centre has funding that comes from a variety of sources, including research councils, the EU, national and local government bodies and corporate collaborators. These include Arts Council England, AHRC, Barrow Cadbury, British Council, DEFRA, EPSRC, ESPON, EU H2020, ESRC, Joseph Rowntree Foundation, LEP, Network Rail, Money Advice Service, Oak Foundation and Unipart.

For further information on the Centre for Business in Society, please visit: <https://www.coventry.ac.uk/research/areas-of-research/business-in-society/>

Research Centre
Business in Society



Key note speakers

Professor Anna Davies -Trinity College Dublin



Anna Davies is Professor of Geography, Environment and Society at Trinity College Dublin, Ireland, where she directs the Environmental Governance Research Group and is a member of the Trinity Centre for Future Cities. Widely published in the fields of geography, environmental policy and sustainability, Anna is a member of the Royal Irish Academy and a Governing Board member of the International Science Council. A Board Member of the European Roundtable on Sustainable Consumption and Production, Anna is a founding member of Future Earth's Knowledge Action Network on Systems of Sustainable Consumption and Production and the inaugural Chair of Future Earth Ireland.

Jamie Crummie, Co-founder of Too Good To Go



Jamie Crummie is the co-founder of *Too Good To Go*, the world's largest marketplace for surplus food. The app lets consumers buy unsold food from restaurants, retailers, cafes, pubs, bakeries and wholesalers so that it doesn't go to waste.

Professor Suzanne Higgs – University of Birmingham, UK



Suzanne Higgs is Professor in the Psychobiology of Appetite at the University of Birmingham. She has a degree in Psychology, Philosophy and Physiology from the University of Oxford and a PhD in Psychology from Durham University. After her PhD, she worked as a Post-Doctoral researcher at the University of Oxford before moving to take up a faculty position at the University of Birmingham. Suzanne leads a research group interested in cognitive and social processes involved in food intake and food choice and the underpinning biological mechanisms. She is Editor in Chief of the journal *Appetite* and Past-President of the Society for the Study of Ingestive Behaviour.

Professor Moya Kneafsey, Coventry University



Moya Kneafsey is a Professor at the Centre for Agro-ecology, Water and Resilience at Coventry University. Moya's work concerns how 'traditional' cultural resources are commodified for tourism, especially in European rural contexts as well as attempts to 'reconnect' consumers, producers and food through 'alternative', local and short food supply chains. She has also undertaken projects on cultural tourism, quality products, rural development, and community participation in food production and consumer perceptions of food security. Moya leads the 'Community Self-Organization for Resilience' research theme.

Panel Debate description and Speaker Biographies

What enabled and constrained community food groups during the Pandemic?

Chairs: Marsha Smith, Centre for Business in Society and Dr. Lopa Saxena, Centre for Agro-ecology, Water and Resilience

What enabled and constrained the delivery of food community food services during the pandemic? In the early stages of lockdown in the UK there were simultaneous restrictions in opening community food spaces, a rise in demand for food aid and huge volumes of surplus entering the redistribution system. An unprecedented scaling up of community food services was undertaken to ensure vulnerable people were fed. Community groups switched to hot meal and food parcel services, taxi's volunteered as delivery drivers, new risks emerged, and new partnerships and procedures were developed.

Most of this vital work happened out of the public view, in dynamic and partial ways, and on an organisation by organisation or city by city basis. In Nottingham alone, for example, social eating groups delivered over 50,000 meals in the first 3 months of lockdown. National Food Service Bristol coordinated food parcels and a new take-away meal service. FareShare Midlands more than doubled the amount of food it redistributed. But what was it actually like to be working in these conditions, and under these demands?

Now that the intense period of service-delivery is over, we are taking time to reflect on how the community food service mobilized during the pandemic. Our panel of corporate, charitable and community partner experts from cities across the UK will each present one challenge they recognise and one opportunity they can identify, based on the work of their organisation or research.

Speakers:

Simone Connolly, Regional Manager, FareShare Midlands



Simone is the Director of FareShare Midlands having started off as a volunteer over 15 years ago. She is super passionate about food waste and making a positive difference in disadvantaged communities across the Midlands region. FareShare Midlands now reaches over 500 community organisations across the Midlands who collectively help to support over 70,000 people every single week with food that would otherwise been wasted. Since Covid-19, service delivery has been extremely challenging and with the added pressure that Brexit is bringing to the supply chain then the next couple of years could be even more challenging. But FareShare still has plans for growth and Simone is confident, with the right investment, recognition and support, that they will be successful.

Outside of work Simone is Mum to two boys who keep her busy. Goes without saying that Simone is a real foody and food rarely gets wasted in her house.

Louise Delmege – National Food Service, Bristol

Louise has been working in community food projects since 2016. Since 2019 she's led the National Food Service, a solidarity network of community food providers up and down the UK. She founded her local branch, NFS Bristol and during the pandemic delivered over 50,000 meals to people in need around the city. Louise also works with Mutual Aid groups across South Gloucestershire, supporting them to provide food for their communities during the lockdowns and now building the South Glos Food Alliance.

Hannah Gallimore - Central England Coop

Hannah Gallimore, Corporate Responsibility Manager at Central England Co-operative for five years. Huge privilege to be facilitator for the strategic direction and monitoring of Central England Co-operative's purpose – to create a sustainable Society for all. Main point of contact for social and environmental sustainability projects.

Megan Blake - Sheffield University

Megan Blake is a Senior Lecturer at Sheffield University. She is a recognised expert in food security and food justice. She has an established international reputation for her research focusing on 3 intersecting strands: 1) Surplus food chains and practices of redistribution 2) Community organisations, social innovation and self-organisation, and practices of resilience 3) Social inequalities. She works closely with local and national scale organisations and local authorities to achieve research impacts that make real change. She is actively involved in public dissemination and has organised and facilitated a number of community engagement events and conferences, has been an invited commentator on national and international TV and radio programmes, and has published in and been quoted by national and international press.

Ellie House, Chief Operating Officer, Foleshill Community Centre, Coventry

Logos and Logistics:

The challenges and opportunities of certifying food production to promote sustainable consumption

Panel chairs: Dr David Bek and Dr Jill Timms, Centre for Business in Society, Coventry University

The use of logos and certifications to reassure consumers about the quality or sustainability standards of produce has become 'standard' practice in some industries and for some products. This is extended to more social and ethical dimensions by some brands, where buying your coffee could save a dog, your bottled water might provide clean water in a far off country, your chocolate could fight for endangered species, your sausages support foodbanks or your ready-meals be guaranteed to pay a living wage. But are consumers becoming overwhelmed by the number and range of logos and issues? How confident are they in what is being promised? And how much will these certifications matter within the many faceted future of food production and consumption?

In this panel we bring together industry, certification and academic experts to share their experience and thoughts on the use of private standards in food production for promoting sustainable consumption. Chaired by David Bek and Jill Timms of the Sustainable Production and Consumption Research Group at Coventry, in this session panellists will each present one challenge they recognise and one opportunity they can identify, based on the work of their organisation or research.

Speakers:

Anna Barker - Head of Commercial Partnerships at the Fairtrade Foundation

Anna Barker is the Head of Commercial Partnerships at the Fairtrade Foundation, where she is responsible for the team working with our major retail and FMCG partners to deliver responsible sourcing solutions in business supply chains across a range of commodities. Prior to joining Fairtrade, Anna worked for Levin Sources, a consultancy dedicated to the responsible sourcing of minerals.

Professor Alex Hughes - Department of Geography, University of Newcastle

Alex Hughes is Professor in Economic Geography at Newcastle University in the UK. She has researched global supply chains, corporate responsibility and sustainable production and consumption for more than twenty years. Projects have investigated corporate responsibility and sustainable production in Kenya, South Africa, Pakistan, the UK and the USA. Current research includes a project, funded by the Economic and Social Research Council, which she is leading with partners at seven universities on sustainable food markets and consumption in Brazil, China and South Africa.

Richard Griffiths - Chief Executive of The British Poultry Council

The British Poultry Council is the voice of the British poultry meat industry and the trade association for producers of poultry meat from chickens, turkeys, ducks, and geese. The BPC addresses issues on all parts of the production chain: breeding, hatching, growing, and processing. We believe that everyone deserves affordable and accessible food that is high-quality, safe, and nutritious, and we are working towards a sustainable future for our sector.

Professor Valerie Nelson - Natural Resources Institute at University of Greenwich

Professor Valerie Nelson has a first degree in Social Anthropology from the University of Cambridge, and a MSc in Rural Resources and Environmental Policy from Wye College, University of London. She has worked in international development since 1992, initially in Belize on forest planning and management, conducting field research in Mayan and migrant communities and followed by research at an agricultural research institute of the University of the State of Mexico in indigenous communities in the central highlands of Mexico. Following a 6-month stint in Bavaria supporting partnership development between European, Latin America and Asia protected areas, she joined Oxfam GB's policy department, evaluating their South-South Environment Learning Programme. Valerie joined NRI in 1996 and has since worked as a social development specialist on a wide range of research and consultancy projects in agriculture and natural resources management in Latin America, Sub-Saharan Africa and Asia.

Kobus Pienaar - Technical Manager for Food Security at Woolworths, South Africa

Kobus Pienaar is a Technical Manager Food Security from Woolworths in South Africa. He grew up on a farm, studied agriculture and qualified as a soil scientist in 1989 from the University of the Free State. His first job was as an agronomist for a fertiliser company responsible for advising farmers in the Eastern Free State on how to grow maize, wheat, potatoes, sunflower and legumes. He then joined a large farmer, who produced and pre-packed a wide range of vegetables for the local and international retail markets, as a Production Manager. After several years, he joined a company that processed value-added products to the local and international markets as their general manager. Not only did they grow their own vegetables, but they also procured from several other farms.

The vegetables were processed through high tech processing methods to achieve a long shelf life and to support the drive towards convenience at the time. He decided that it was time for a change and joined Woolworths' produce team as a Food Technologist in 2004. He immediately started to work on a sustainable farming program, called *Farming for the Future*, which looks at sustainable production and processing methods based on scientific measurements. The program started small but is now currently active in more than 600 farms in South Africa, delivering sustainable and nutritious food to Woolworths. Farmers on the program show continual improvement over time and they are now producing more food with less water, less pesticides and less land. Although he took a two-year break to assist Walmart in

their direct farm program, he returned to Woolworths to focus on the *Farming for the Future* program.

The program achieved many significant acknowledgements which includes Forbes and Stanford University. He obtained his post graduate diploma in sustainable development from Stellenbosch University in 2012. Currently he is responsible to ensure Woolworths contribute to a sustainable Food System in South Africa.

Mandatory food waste Reporting for Businesses: Opportunities, Challenges and Implications

Panel Chairs: Dr. Annesha Makhal, Dr. Katrien Steenmans, Dr. Shantanu Mullick and Dr. Jordon Lazell, Centre for Business in Society, Coventry University

Much more action and incentives are needed to achieve Sustainable Development Goal (SDG) 12.3 (halving per capital global food waste along production and supply chains). A strategy towards ensuring the achievement of this goal is requiring businesses to report how much food waste they generate. With some areas of the world already introducing such measures, and the UK currently looking to introduce such measures, this panel debate takes a look into their effectiveness and potential, challenges that arise and longer term implications.

Speakers:

Dr Carrie Bradshaw - Lecturer in Law, University of Leeds

Dr. Carrie Bradshaw joined the School of Law at the University of Leeds in 2018. Prior to this she was a Lecturer in Law, University of York (2013-18) and Teaching Fellow and Research Student, University College London (UCL) (2010-13). Her current research examines food waste as a distinct legal and policy problem. As part of this work, she is an ESRC Parliamentary Academic Fellow, working with the Parliamentary Office of Science and Technology (POST) to support scrutiny of Government interventions to manage [food waste](#) in the context of broader food security challenges, particularly against the backdrop of the UK's forthcoming departure from the EU.

Francesca Goodman-Smith - Transform Program Leader, Fight Food Waste CRC

Francesca is TRANSFORM Program Leader at the Fight Food Waste Cooperative Research Centre. She brings research, policy and industry experience to the role. Prior to joining the CRC she worked as Waste Minimisation Manager for Foodstuffs NZ, New Zealand's largest grocery retailer. In this role she solidified research and industry partnerships to understand the emerging sector of upcycled foods, where surplus and by-products are transformed into new food products. Francesca works globally across the sector as the International Representative for the University of Otago Food Waste Research Theme in New Zealand and co-chair of the Standards Committee for the Upcycled Food Association in the USA.

Martin Bowman - EU Campaigns Manager, This is Rubbish

Martin Bowman is the Senior Policy and Campaigns Manager at [Feedback](#), and manages Feedback campaigns related to food waste, anaerobic digestion and industrial livestock. His focus is on the need for regulatory approaches to food waste, the inclusion of farms in international food waste measurement, and a just transition to less and better meat. He was previously the UK coordinator for Feedback's Gleaning Network and worked on its Pig Idea campaign. He is a contributor to [Routledge Handbook of Food Waste](#), a [TEDx speaker](#), and has helped coordinate several [This Is Rubbish](#) campaigns including Plenty to Share, Stop the Rot and the EU food waste campaign. Martin holds an MSc in Globalisation and Development from the School of Oriental and African Studies.

TRACK A - The Evolving Crisis of food waste from farm to fork

Track Description

Current levels of food waste are abhorrent with 931 million tonnes of food wasted globally in 2019 (UNEP, 2021). Within the UK, 10 million tonnes of food is thrown away annually, accounting for 3% of national greenhouse gas emissions (WRAP, 2019, 2011). Food waste is both a consumer behaviour issue – households remain responsible for the majority of food wasted with an estimated 20 million slices of bread, 4 million potatoes and 3 million glasses worth of milk thrown away daily in the UK alone (WRAP, 2019) – as well as a structural challenge in the supply chain (Bradshaw, 2020).

Whilst great strides have been made in tackling food waste in the UK (Champions 12.3, 2021), there are still many challenges to overcome. The pandemic exposed the fragility of disrupted supply chains where waste was generated through fluctuating demand (Aday and Aday, 2020). There is a need to understand the implications of consumers' short and longer term changing patterns of food provisioning. Furthermore, there is a need to better integrate food waste with national and international environment and climate targets (Feedback, 2020). Food waste remains an evolving crisis that can be situated as a systemic output from the current arrangement of the food system.

Consumers' perception of smart labels: A situated approach

- **Ada Maria Barone, Aarhus University, Denmark and Goldsmiths, University of London**
- **Jessica Aschemann-Witzel, Aarhus University, Denmark**

Despite calls put out in recent years at both national and international level to reduce food waste (EPA, 2015; United Nations, 2020), 931 million tonnes of food (UNEP, 2021) are still wasted each year, with around 61 percent of food waste generated inside the household (UNEP, 2021). As a result, technological efforts have centered around the development of new innovations aimed at helping consumers make more informed choices, ultimately reducing food waste. These include *smart labels* placed on food packages that tell consumers whether the food is still safe to consume (Morrison, 2020) and that are aimed at reducing consumers' heavy reliance on expiration dates when evaluating food safety (e.g., Kavanaugh and Quinlan, 2020; Davenport, Qi, and Roe, 2019).

However, while the introduction of these innovations is on the rise (Morrison, 2020), there is scant research about consumers' response to these novel tools (Brennan et al., 2021). Furthermore, prior literature on this topic has largely neglected to account for the everyday context in which these innovations should be integrated and how these could affect consumers' daily practices (Brennan et al., 2021). More specifically, *food handling practices* can be defined as the collection of practices and activities involving food in various ways (Hebrok and Heidenstrøm, 2019) and have been shown to be a key determinant of consumer-generated food waste (Doberning and Schanes, 2019; Evans, 2011). As such, methodological approaches focused on the understanding of how practices form and can change, have been considered most appropriate for the investigation of consumers' food waste behaviors (Brennan et al., 2021; Doberning and Schanes, 2019; Evans, 2012).

Therefore, we have conducted a qualitative study with UK consumers with the aim of exploring consumers' perception of *smart labels* by investigating how these tools could be situated in the context of consumers' everyday practices. Specifically, we run *asynchronous*, text-based focus groups with eighteen consumers that ran over the course of seven days. The focus groups were organized in three main phases: consumers' general perception of freshness and expiration dates (Day 1); consumers' practices in relation to purchase, use, storage, and disposal of red meat (Days 2-4); consumers' perception of smart labels and how these could affect consumers' food handling practices (Days 5-7).

Findings from the present work suggest the key role played by expiration dates and consumers' own senses in affecting consumers' food-related decision-making processes. As a result, these factors emerged as significant barrier to the acceptance of smart labels as participants expected to still rely on these cues before fully trusting the label and using it as a sole driver of choice. Nevertheless, participants viewed smart labels as useful for reducing food waste through better storage and disposal practices.

The findings of the present work provide useful insights and have important implications for companies developing and commercializing smart labels aimed at

tackling food waste. First, our work suggests that educating consumers is key to overcome the initial reluctance towards these innovations, ultimately leading to acceptance. Second, findings about the benefits identified by consumers in the use of smart labels suggest potentially effective arguments to be used by companies developing these tools to engage and convince retailers to use such labels in their stores or on their products. Finally, the extensive positive effects of smart labels in terms of reduction of food waste provide useful insights to be used by policy makers to pressure actors of the food supply chain towards the broad acceptance of these novel tools.

Planning to waste? Addressing household food waste through resolving the practice of food planning

- *Jordon Lazell, Coventry University*

Food waste resulting from households continues to be an abhorrent problem. Researchers have called for greater attention on how food behaviours are situated in the prevailing organisation of everyday life to give explanation to why food comes to be wasted (Evans, 2014; Hebrok and Heidenstrøm, 2019). Existing literature on planning and food waste has overlooked the intricacies of the practices through which food comes to be wasted, segmenting consumers into those that plan and those that do not.

This paper reports the findings of a mixed method study with 23 households with enquired into the relationship the relationships between everyday practices and how food transitions to become surplus and waste. The research finds that waste can be attributed to how food planning is inconsistently resolved according to temporal and temporally independent factors, employed as both a formal menu or list as much as a mental exercise of negotiating circumstances and resources available. Planning was even shown in some cases to generate food waste where households plan meals, purchase food accordingly but then plans are not realised. A diagram is offered to explain how planning is resolved in different ways from far to near mealtimes. Overall findings reveal the need to appreciate the temporal and coordinative demands required for successful planning and the inaccuracies present in current food waste campaign materials.

Consumer edibility perceptions: The edibility threshold

- **Annesha Makhal, Coventry University**

The latest estimates show that 17 per cent of the food grown globally is wasted (Forbes et al., 2021), accruing a myriad of social, economic and environmental problems (Gustavsson et al., 2011). Although there has been extensive research on quantifying this waste, inconsistencies in the definitional scope have led to non-comparable food waste and loss data (Chaboud & Daviron, 2017). A major reason to why food waste occurs and why it is difficult to measure it is because consumer perceptions about edibility are variable. Indeed, Papagyropoulou et al. (2014) comments that edibility is variable and is governed by several factors, ranging from cultural factors to personal preferences (p. 112). This is an impediment to gauge how countries are keeping up with meeting the United Nation's Sustainability Target 12.3 (to halve food waste and reduce food loss by 2030). To overcome this drawback, the Food Loss and Waste Protocol (2016) has used 'edibility' to conceptualise food waste into *edible parts* and *inedible parts* (Hanson et al., 2016). Edible parts are 'wasted food' or parts of food that was once edible before it deteriorated to a point where it is inedible, and inedible parts are parts of food that are not meant for human consumption. As consumer's edibility perceptions are variable (Papagyropoulou et al., 2014), there is a dearth of research that explores what determines these perceptions, how do they form, and how they are influenced.

Survey research has shown that consumers' perceived edibility varies greatly from consumers' actual consumption, i.e., consumers are more likely to perceive food or parts of food as edible, even if they do not personally eat them (Nicholes et al., 2019). The perceived edibility holds importance for the actual consumption of suboptimal foods (Aschemann-Witzel et al., 2019). For example, in focus group discussions, children confirmed that while they consider bruised/discoloured fruits and vegetables as edible foods, they or their families do not necessarily eat them (Makhal, Thyne et al., 2020). This influences whether perfectly edible suboptimal food are either repurposed/eaten or discarded at home (Makhal, Robertson et al., 2020). This paper proposes to conceptually explore the *edibility threshold* which consumers and households apply when deciding to repurpose or eat foods that have gone past their most optimal state. Exploring the edibility threshold will help get a more nuanced understanding of why households continue to hold the largest share of food waste globally at 61 per cent (Forbes et al., 2021). Being an explorative quest, qualitative research methods, including field trips and observations, focus group discussions, and interviews are best suited to understand this how perceived edibility is applied in households, thereby revealing how consumers deal with the edibility threshold. Understanding the edibility threshold becomes valuable for future food waste avoidance campaigns targeted towards households.

Hospitality food waste: Influencing others to prevent food

- ***Natalie Pearson, University of Bath***

The COVID-19 pandemic resulted in temporary closure, ongoing restrictions, and increased unpredictability for hospitality businesses. The unprecedented effects of this crisis amplified existing challenges like food waste, but also offers learning opportunities about how hospitality businesses can make greater strides in reducing food waste.

Existing literature quantifies and defines food waste, establishes reasons for its occurrence and determines strategies for its prevention. However, little is known about the underlying processes hospitality workers go through when tackling food waste and how they communicate with others about food waste prevention. Using sensemaking as a lens, this research explores the processes hospitality workers go through when tackling food waste, how they influence others' perceptions of food waste and how to prevent it, and how they are influenced by others and the environment around them.

To date, nineteen interviews have been conducted with owners and employees at mainstream and sustainability-led cafes, restaurants, hotels and caterers, in order to capture and learn from a wide-variety of perspectives and experiences. This data collection has taken place over the last fourteen months and has captured the unique perspectives of hospitality workers at different stages of the pandemic as they face multiple challenges beyond food waste, while these same challenges have often had a direct impact on food waste.

The findings so far demonstrate how hospitality workers define and interpret food waste in order to tackle it, and how they attempt to influence others' perspectives of food waste by altering the method, content and manner of communication to suit the receiver(s), for example, based on their physical proximity and existing relationships. It also illustrates the ways in which hospitality workers' sense of food waste and how to prevent it are influenced by others and what makes them receptive to others' communication. Moreover, the data identifies aspects in both the immediate and wider environment that either amplify attempts to influence others and/or create barriers to their reception depending on different factors. For example, at the beginning of the pandemic, COVID-19 interfered with communication about food waste. However, as the pandemic progressed, it had an amplifying effect on receptiveness to communication about food waste and other sustainability issues.

The research is important because understanding the processes hospitality workers go through to tackle food waste and under what conditions they influence, and are influenced by, others is necessary to ensure that communication about food waste prevention is successful and leads to meaningful and continuous action by those who work in the hospitality industry.

Identifying New Product Opportunities from Waste: Eliminating Waste in Tomato Production

- ***Diana Salgado, University of Portsmouth***
- ***Christopher Simms, University of Portsmouth***

Whilst a lot has been written on new product development and idea generation, there is not much written about generating ideas in a sustainable product development context and even less so when it comes to using agricultural waste. Yet, the literature widely acknowledges the need to utilise sustainable materials and reuse waste. Our paper presents a single case study of a UK agricultural producer that grows tomatoes. Within tomato production significant volumes of waste are evident, such as unripened, imperfect, damaged and overripe fruits. When tomatoes go to waste it produces a significant impact, as a result of the resources used to grow the tomato. Furthermore, when tomatoes are processed to produce ketchup, passatas and juices, other sources of waste are generated such as seeds, skins and water. We present a new framework for the identification and evaluation of new product opportunities through tomato waste. This framework offers a new perspective to conceptualise the different types of waste produced and identify their relative properties. Our case study analysis reveals the volumes of different types of tomato waste produced and reveals the different sensory, nutritional and functional properties of each. We then demonstrate how through an analysis of each of these properties it is possible for firms to uncover the product opportunities that each presents. For example, in the tomato juice production around 5% of the raw material goes to waste since skins and seeds cannot be used.

However, skins and seeds are nutritionally, sensorially and physically useful and versatile. In terms of nutrition, the skin of tomatoes is rich in essential amino acids such as lysine, valine and leucine and minerals like Ca, K, Na, and Mg while the seeds are rich in threonine and lysine and oleic and palmitic acids (Løvdal et al., 2019). Additionally, both skins and seeds from tomato are rich in lycopene (73.4 mg/100 g and 13.0 mg/100 g, respectively), an antioxidant with several reported health benefits (Fachinello et al., 2018; Lu et al., 2019). In terms of sensory characteristics, the skin contains crystalline cellulose that can be used in food matrices to improve mouthfeel, particularly when used as fat replacer in low fat products. The seeds meanwhile are reported to increase hardness in flat bread (Lu et al., 2019). In terms of physical functions, tomato skins are partially permeable to liquids and gases (which has potential in packaging and biodegradable tableware), can be used as excipient in medicines (when crystalline cellulose is extracted) and can reduce the formation of lumps in food products. Physical properties of tomato seed powder reported include: being effective in removing organic dye molecules from coloured textile effluents (Najafi et al., 2016). Therefore, the analysis of the nutritional, sensory and physical characteristics of tomato waste can lead new product developers to explore new alternatives in industries different from the original source of waste.

Track B - Key issues, challenges and solutions to food and nutrition insecurity

Track Description

A rising number of people are food insecure in the UK, with an increasing number of recipients experiencing in-work poverty (The Trussell Trust, 2019). Even before COVID-19 struck, the UK was behind its commitments to end all forms of malnutrition by 2025 (UKSSD, 2018). Exacerbated by the longstanding impacts of austerity, the rapid growth of households in need of food assistance was a marked feature of the pandemic.

The coordinated response of local authorities and voluntary and community sector organisations served as a lifeline to many households. However, this response has been emergency-driven, and we know little about how this endures in the longer term as the aftershocks continue, and economic crisis deepens. Further, there is increasing evidence of the unequal impact of the pandemic on particular groups (e.g. minority ethnic groups, marginalised groups, people with disabilities, children in low-income families).

The need to develop place-based and rights-based strategies, which ensure that no one is left behind, is becoming a critical imperative. Further, the need to look for longer-term approaches to food and nutrition security is becoming evident. There is little understanding, however, so far on how these intentions can be translated into effective practices and policies at different levels.

Are nutritious diets affordable to people from various states of India? An exploratory study

- ***Suneeta Chandorka, The Maharaja Sayajirao University of Baroda, Gujarat, India***
- ***Purva Bahadkar, The Maharaja Sayajirao University of Baroda, Gujarat, India***

Background: The availability of affordable and sustainable diets is the key to achieve SDG-2 targets. The usually consumed diets by our population are either lacking in macro and/or micronutrients as the nutritious diets are not affordable to them. Under the circumstances, women are at a higher risk of undernutrition.

Objectives: The present study aimed at assessing the affordability of usually consumed and 4 hypothetical diets (vegan, vegetarian, ovo-vegetarian and mixed) from various states of India.

Method: The exploratory study was carried out using appropriate secondary source data and Cost of Diet software. Data from NSSO report round-68 was used for consumption data for all the states of India. Cost of Diet software was used to arrive at the cost of 4 hypothetical diets. Wholesale prices were used for food commodities from Ministry of Consumer Affairs, National egg coordination committee, and Directorate of Marketing & Inspection (DMI), Ministry of Agriculture and Farmers Welfare, Government of India, Indiastat, Indiamart, & National Horticulture Board of India. Affordability of diets for men and women in urban and rural areas of various states of India was calculated by considering the international poverty line (\$1.90) as the cutoff for per capita daily income.

Findings: The cost of usually consumed diet for men was reported to be higher in urban areas than in rural areas in most of the states of India while the vice versa was true for women. The average cost of usually consumed diet for men and women was ₹45.2 and ₹36.4, respectively in rural areas and ₹49.9 and ₹40.2 respectively for men and women in urban areas. The energy only diet and macronutrients diet (provides only macronutrients from cheapest source affordable to the population) were found to be affordable for populations across all the states while the nutritious diet (that provides all the essential nutrients) was affordable to most of the states except Tamil Nadu and Madhya Pradesh. The cost of energy only and macronutrients diet ranged between ₹9 to ₹12 and nutritious diet ranged between ₹56 to ₹177. Women from rural areas of 21% of the states had adequate MDD-W score while in 39% of the states women from urban area had adequate MDD-W indicating low food security.

Conclusion: Reshaping the food system from production to consumption can help in achieving SDG2. Incentives for production, storage and minimal processing of fruits and vegetables will improve the dietary diversity and taxation measures to influence the relative prices of nutritious and not so nutritious foods will promote the affordability of diets.

Innovation and change in the provision of emergency food aid during the pandemic

- *H Mulrooney, Kingston University*
- *D Bhakta, London Metropolitan University*
- *R Ranta, Kingston University*

Introduction

This paper examines the changes to the provision of emergency food aid during the Covid-19 pandemic, with a focus on the implementation and long-term viability of new innovative practices. It has been well documented in the media,¹ academia,² and by organisations involved in emergency response³ that during the pandemic there was an unprecedented rise in the number of people seeking food aid.

There was also a larger surplus of food available and more volunteers providing their time. New organisations sprang up in direct response to the pandemic while those already existing adapted and innovated to respond "at speed" to the unprecedented emergency.

Methodology

This paper explores how new and existing public, voluntary, and community organisations adapted, innovated and responded during the pandemic in Southwest London and Sussex. Semi-structured interviews were conducted with individuals running and/or volunteering in these organisations, either online, face-to-face or through physical site visits, typically lasting around 30-45 minutes. The questions were structured to explore the role of the individual in the organisation, their experiences before and during the pandemic and how they adapted and innovated. To date, over 20 interviews have been conducted with organisations, small, large and independent.

Results

A number of key themes were identified. Firstly, there was a large increase in the number of people accessing food aid. The clientele also changed with more families, single parent families, people with mental health problems, the elderly and unemployed seeking help than before the pandemic. There were also additional reasons for seeking help, such as shielding, concerns about leaving home, ill health (including COVID-19 infection) and limited access to digital technology. A significant increase in food availability occurred, including surplus food from closing restaurants, cafes and pubs, generosity from the public, local businesses, supermarkets and money from grants, charities and the government to purchase food. An "at speed" response was necessary in terms of adapting the food delivery - with more provision of cooked foods and doorstep delivery of food, food boxes and shopping.

One clear innovation was the increased co-ordination and co-operation between these organisations and how they supported each other and shared their resources. Lines of communication were formed leading to the development of new

partnerships. The requirements of the "new clientele" in terms of their food preferences, cultural and nutritional needs were also considered. Many of the organisations are now thinking beyond the provision of emergency food aid and exploring how the determinants of food poverty and insecurity can be addressed, for example by providing well-being support, life skills advice and supporting cooking and food knowledge. New enterprises have also sprung up such as community supermarkets.

Conclusion

Fresh ideas and approaches to food insecurity are apparent. It is likely that some of these new innovations would have happened anyway, but the pandemic brought with it more money, grants, better coordination and cooperation and a new class of professional volunteers. The main question we have at this stage is whether the positive changes identified will last.

Feeding the People in Wartime Britain: lessons for contemporary food policy

- ***Evans, B. Liverpool Hope University***

A significant historical blind spot exists in current discussions around UK food poverty and food policy: the social eating schemes of the world wars. This paper outlines the hidden history of these important precedents in the question of Feeding Britain, exploring the role of the state, the private sector, and voluntary actors. This is an essential 20th century backdrop to the matter of emergency food provision today, and the paper explores how many of today's debates around food policy first occurred decades ago

Track C - Digital platforms as sustainable food solutions

Track Description

Innovative businesses models have sought to apply technology to provide solutions to tackle food waste and provide new ways of accessing and consuming food (Mullick, Haans and Nijssen, 2020). Consumer to consumer and businesses to consumer platforms such as OLIO and Too Good To Go have pushed forward a new landscape of food redistribution, connecting neighbours and local shops to help prevent food surpluses from becoming waste. Information technology is reshaping such activities across the supply chain under a sustainability agenda. Digital platforms such as Food Cloud and Plan Zheros have connected the food industry to charities to aid the donation of surplus providing a basis for a scalable system.

Accompanying this technological development is a processes of formalisation. Charities and community recipients are entrusted to comply with food safety legislation in the same way as businesses. Questions have been posited over whether the same commensality that comes with sharing food and eating together offline can be present through these digital exchanges (Smith and Harvey, 2021; Spence, Mancini and Huisman, 2019). Further research is required to understand the implications of the rise in digital platforms in their usage for sustainable food provision. Who are the winners and losers of this trend and to what extent should they form part a sustainable food future?

Barriers and Challenges from food waste reducing platforms: the Brazilian case

- *F De Almeida Oroski, Federal University of Rio de Janeiro*
- *M Fujimoto, Federal University of Rio de Janeiro*

According to Food Waste Index Report 2021, around 931 million tonnes of food waste was generated in 2019, being 61 per cent of which from households, 26 per cent from foodservice and 13 per cent from retail. The report also points out that low and middle-income countries' food waste per capita, such as Brazil is close to that observed in high-income countries. This context reinforces the importance of developing different strategies and solutions to address the food waste problem. Among the various solutions to tackle food waste are digital platforms. Food waste-reducing platforms have proliferated in different countries and regions, such as the United States, Europe and Asia. However, most existing studies refer to the development and/or use of these platforms in high-income countries. These platforms can be seen as a recent phenomenon in Brazil, with few cases arising in the last five years, which somehow explains why little is known about the barriers and challenges faced by entrepreneurs. In this context, this study aims to identify and explore the main barriers and challenges faced by Brazilian innovators of food waste reducing platforms.

Our methodology is based on exploring four case examples of Brazilian food-sharing platforms. The case examples were selected applying the following criteria: (1) platforms that focus on commercialization of donation of surpluses, non-aesthetic standards (imperfect), and close to date expiration food or services as food donation/sharing. (2) sharing for money platforms, according to the classification by Michelin et al. (2018) (3) platforms that are already in operation, which allows identifying challenges derived from the structuring process of business models. We applied semi-structure interviews carried out with the digital platform's founders between the 2009 and 2020 years. We adopted the content analysis approach (Bardin, 2011) to identify innovators' main barriers and challenges. As it is a new topic in the existent literature, the inductive method was adopted to map the barriers and challenges from the Brazilian perspective, following the procedures by Bardin (2011) and Mayring (2014). We identified thirteen barriers and challenges divided into cultural, commercial, technological, organizational, economic, and institutional categories.

Some examples mentioned by the innovators were: the lack of knowledge of Brazilian consumers concerning food-sharing platforms; the resistance of commercial partners to realize that there is an economic opportunity to combat food waste; the lack of food waste indicators; most food system actors consider food waste as part of current business models, among others. The innovators showed they had to adapt their business models to couple economic, social and environmental benefits. They affirmed they were really concerned about how their businesses could contribute to reduce food insecurity by reaching people in need. They emphasized that their initiatives are, in essence, businesses with real social and environmental impacts. All interviewees signalled that a lack of an institutional environment in favour of sustainable and circular business models hinders the flourishing of food-sharing platforms. They believe the absence of a governmental agenda to reduce food

waste explains many barriers and challenges cited. This scenario inhibits the emergence of innovative businesses related to the issue and contributes to their low economic viability as well.

Co-creating value from failed experiences in the sharing economy

- ***Vanja Ljevar, University of Nottingham***
- ***Georgiana Nica-Avram, University of Nottingham***
- ***John Harvey, University of Nottingham***
- ***Ines Branco-Illodo, University of Stirling***
- ***Samanthika Gallage, University of Nottingham***
- ***James Goulding, University of Nottingham***

This paper investigates complaints logged on the public forum of the world's most popular food redistribution platform, OLIO, to offer a new understanding of failed experiences in the sharing economy. Various consumer researchers (Scaraboto and Figueredo, 2021; Harvey et al., 2020; Scaraboto, 2015) have drawn attention to the cocreation challenges emerging in the sharing economy. In computer-mediated sharing, consumers often need to cocreate experiences with one another despite their differences in values and practices - and simultaneously reconcile a desire for both impersonal transactions and meaningful social interactions, while managing risk together. OLIO brings together consumers who give and receive food, retailers who avoid food waste by offering surplus, and a volunteer network dedicated to redistributing it. Rather than encompassing a monolithic 'brand community', OLIO also harbours a plurality of views and practices, which sometimes lead to failed experiences.

To understand where food sharing fails, we interrogate a corpus of 11,921 posts from OLIO's forum. Two steps underpin this analysis: we first identify a subset of complaints from public posts and then model their linguistic and situational indicators through machine learning. The predictive model produced is then applied to estimate the prevalence of complaints on OLIO's public forum, and how they relate to types of failed experiences.

Our initial findings show how complaints have distinctive linguistic characteristics, but often exemplify a plurality of voices and forms of narrative emerging around food sharing. We look in more depth at examples of complaints to evidence sentiment extremity (Mudambi and Schuff, 2010) and mixed-feelings (Berrios, Totterdell and Kellett, 2015) as indicators of consumers' heterogenous regulatory focus (Shin, Song and Biswas, 2013). The results challenge binary understandings of word-of-mouth, whereby complaints occupy the negative end of the spectrum. In turn, they raise questions about how consumers overcome failed experiences and enable the equitable redistribution of food via computer-mediated interactions.

SHARE-IT: Barriers and opportunities for reporting on the sustainability impacts of food sharing initiatives

- ***Alwynne H. McGeever, The University of Dublin***
- ***Anna R. Davies, The University of Dublin***

There is general consensus that the food system is unsustainable¹ but the complexity of food chains means identifying leverage points to redirect it towards sustainability is challenging. Food sharing initiatives (FSIs) - that grow, eat and cook food together, or redistribute excess food - are among organisations developing innovations responding to these complex challenges in different ways. The SHARECITY100 database quantified over 4000 ICT-mediated (information communication technologies) of such FSIs active in 100 cities. However, at present the full potential and impacts of FSIs are poorly understood, partly due to a lack of data collecting and reporting practices. Issues like capacity, resources, funding, data collecting challenges and the nuance of long term and diverse impacts make it challenging to communicate impacts. SHARE IT, an open access, online and free reporting framework, co-designed specifically for and by FSIs, makes an intervention to change this.

However, a feasibility study for rolling out the tool concluded that there is no commercial market for the tool currently, with little capacity amongst FSIs to pay for this service or to embed even simple sustainability self-reporting practices in their operations. While local authorities are interested in the tool, they also have limited capacity to support reporting and no external or top-down drivers requiring them to do this. Similarly, there is little pressure on retailers donating surplus food to FSIs to consider the impacts this practice has either on their overall operations (e.g. to reduce food waste generated in the first place) or in terms of the downstream impacts on community groups that use the surplus food. Interviews with private and public stakeholders have indicated that there is a palpable awareness of the urgent need for holistic sustainability reporting that takes account of the on the ground impacts achieved by FSIs utilising food donations from food businesses and the funding and policy tools from public authorities. However, sustainability reporting stakeholders in both sectors are not currently prepared to extend data collection to benefit from digital solutions like SHARE IT offers. Most reporting by commercial and state bodies only focus on a small number of economic and environmental metrics derived from crude formulas that convert the weight of food diverted from the waste stream to economic value and carbon equivalents.

Qualitative data, social impact metrics and downstream impacts are not assessed. This demonstrates a significant gap between the potential of digital platforms as sustainable food solutions and the reality of reporting readiness levels. Digital platforms can support sustainable food solutions, but there are significant policy, funding and capacity challenges to be addressed to actualise this potential. Specifically, there are inadequate market and policy pressures to enable FSIs to engage in sustainability reporting. Policy tools such as fines for wasting edible food (aligned with the food waste hierarchy) and obligatory public facing holistic, full cost accounting and sustainability reporting could increase incentives to support the use of SHARE IT. Improved monitoring obligations, target commitments and a higher visibility for, and value given to, social impacts among public authorities could help direct public funding and support mechanisms to measure FSI impacts within a jurisdiction.

The recent pandemic context 'has revealed with greater clarity the unsustainable pinch points across the food system, from persistent levels of food poverty to a dependence on extensive, just-in-time and heavily carbon-intensive supply chains. Creating effective policies to transform the food system to a more sustainable future will require both quantitative and qualitative data on the diverse and nuanced social, environmental and economic impacts of food sharing. The free SHARE IT toolkit offers a digital solution to this challenge but requires an enabling policy environment and market to achieve its potential.

Which categories should supermarkets upload on food waste reducing digital platforms?

- ***Shantanu Mullick, Coventry University***
- ***Néomie Raassens, Eindhoven University of Technology, The Netherlands***
- ***Mohammad Rizky Nurman, Eindhoven University of Technology, The Netherlands***

Consumers as well as supermarkets are increasingly conscious of the need to reduce food waste (Cicatiello et al., 2017). Supermarkets recognize the financial and reputational benefits of reducing food waste in their operations (Winsight Grocery Business, 2018) and are, as a consequence, at the heart of initiatives to reduce food waste (Capgemini, 2017).

A particularly interesting food sharing initiative that has seen a rapid increase in adoption by grocery retailers across several Western countries is ‘last-minute’ discounting of perishables close to their recommended expiry date (Aschemann-Witzel, 2018; Food Loss & Waste Protocol, 2018; Principato, 2018). It helps (i) retailers reduce food waste thereby mitigating the financial loss associated with it, but also (ii) satisfy consumers’ desire for saving money (Aschemann-Witzel, 2018; Aschemann-Witzel et al., 2017).

However, information on these ‘last-minute’ discounts do not always reach consumers in time (i.e., before the recommended expiry date), thereby rendering these discounts ineffective. Fortunately, food waste reducing digital platforms, such as My Foody (Italy), Food Loop (Germany), and Too Good To Go (in several Western European countries), have created IT solutions to facilitate timely information exchange between supermarkets and consumers (cf. Capgemini, 2017). Apart from swift information dissemination, these digital platforms also play a role in inducing consumers to visit supermarkets which also leads to cross-selling opportunities.

Despite several upsides to uploading these last-minute discounts on digital platforms, they also pose a number of challenges to supermarkets. To upload last-minute discounts on the platforms, supermarket staff need to separately scan each of these product using a mobile app. This creates significant strain on supermarket staff, whose workload have already increased due to the post COVID-19 acceleration in online ordering. As a consequence, staff make mistakes that result in expired products still available on supermarket shelves. These omissions often attract significant fines from the regulator (Guardian, 2021), that also leads to negative press. Given these circumstances, supermarkets can save staff time by prioritizing the upload of some categories over others on the digital platform.

The objective of our study is to help supermarkets understand which category of products uploads, on the digital platforms, generate a stronger and more sustained response from consumers. We use data from one such digital platform and observe the activity of 10 supermarkets, across different product categories, in their first year of joining the platform. Specifically, for each category, we observe the number of products uploaded on the platform as well as the number of consumers views that they generate. We model this panel data of category-specific uploads and views using a

Panel Vector Auto Regression (PVAR), which allows us to estimate the short-term and long-term impact of product uploads on consumer views, while controlling for endogeneity, reverse causality and feedback loops (Pauwels 2004).

Our preliminary results show that when considering the short-term impact of uploading products on consumer views, the ready-to-eats and freshly prepared juices categories has the strongest response, followed by the meat and fish category and subsequently the fruits and vegetables category, with the dairy, cheese and eggs category having the weakest response. The long-term impact of uploading products on consumer views also follows the same ordering, with the first two categories exhibiting a noted persistence in the impact. Our findings help supermarkets prioritize which category of products to upload on digital platforms and thus we are able to contribute to the food waste literature as well as the retailing literature.

The Role of Digital Platform in Waste Recovery in the Food Supply Chain

- ***Shuang Tian, University of Nottingham***

Food waste is generally seen as highly unethical because of its negative impact on the economy, environment, and society and has attracted researchers' widespread attention. The complexity of the food waste means that solutions are limited by both the supply and demand sides and distance constraints. The recycling of food waste requires establishing information sharing channels in the food supply chain to promote close contact between waste owners and potential demanders, which promotes the flow and recycling of food waste. However, the lack of relationship between suppliers and potential demanders hinders the delivery of waste products, conceptualized as "structural holes" in social network research. In recent years, the digital wave has brought a new type of supply chain participants: digital platform organizations, which seem to be able to break the deadlock of food waste.

The current social network literature provides conceptual information (structural holes and brokers) on the challenges and mechanisms of waste recycling. The food recovery digital platform in the food supply chain acts as a market intermediary to bridge the communication between the supply and demand sides at the two ends of the structural holes, fulfilling the function of "brokers". In addition, the food recovery digital platform promotes information sharing between the supply and demand sides through brokerage, which has been proven in the transaction cost theory to reduce the transaction costs of both parties and improve the performance of the supply chain. However, related research on digital platforms and supply chains focuses on the economic model, dissemination, and classification of food-related digital platforms, ignoring the role of platforms work as "brokers".

There are gaps in supply chain structure issues and the specific role of food recovery platforms in promoting food recovery. In terms of precisely explaining the structural holes of the food recycling supply chain and how digital platform organizations act as brokers to promote waste recycling, research has not yet caught up with practice. This research helps bridge this gap by exploring existing food recovery platforms and food recycling-related supply chains. In sum, this research explores structural holes and the role of brokerage of the food recovery digital platform in the food supply chain.

This research combines network research, transaction cost research, and supply chain research and explores how food recovery platforms can solve food waste problems in the food supply chain by bridging structural holes. A mixed research method is adopted to uncover structural holes between supply and demand and how digital platforms act as brokerages, promote information sharing, and foster waste recycling. This research contributes to the existing knowledge system of social networks research, transaction cost theory and sustainable circular supply chain research. In addition, this research has practical implications for relevant practitioners, digital platforms, and policymakers in the food recycling industry.

Track D - Alternative experiences of producing, consuming and eating

Track Description

The pandemic has been viewed as a moment for pause to think outside the current mass industrial systems of food supply; as an opportunity to engage with alternative practices of food production, provisioning and consumption. The growing demand for alternative food provision has spawned many initiatives which reimagine how food is commoditised and distributed through supply chains.

The pandemic has given consumers space to consider what food is available locally, ranging from informal self-organised community activities, to offerings from small and medium sized enterprises (Rowan and Galanakis, 2020). The increase in demand for veg boxes and rise in requests to join community supported agriculture schemes are good examples of this trend. This has given credence to alternative food systems, as a turn away from monocultures of retailing uniform food, to a more diverse system that can respond quicker to changes circumstance and provide more resilient (and biodiverse) landscapes of food production (Burnett and Owen, 2020).

Healing Precarity in Food Systems: CSAs, Covid-19 and Complexity

- ***Lauren Blake, University of Bristol***
- ***Jaskiran Chohan, University of Bristol***

Our global food system has a worrying role to play in our vulnerability to pandemics. Furthermore, Covid-19 hit our food system hard, especially the initial shocks in supply and demand. The jolt to the food system that the pandemic imposed has brought to the fore some of the social, economic and environmental challenges.

This presentation analyses precarity in food systems, with a focus on smallholder community farming initiatives in the United Kingdom (UK), namely, Community Supported Agriculture (CSA) farms, and their experiences during the first months of the Covid-19 pandemic. A systems perspective enables a transdisciplinary approach, which helps identify and connect precarity across different elements and dynamics of the food system. The paper grounds this theoretical approach in data from an online qualitative survey with 15 anonymized participant CSAs, which sought to understand how they experienced and adapted to the sudden challenges in the first months of Covid-19, and provoke wider questions about sustainability, resilience, precarity and ways to address complexity with systems thinking. These case studies are insightful in outlining the different forms of precarity experienced both prior to and during the pandemic, as well as the nimble strategies with which CSAs address and heal precarity in food systems at the local community level. The paper argues that CSAs experience precarity from pressures inherent to the corporate food regime (McMichael 2009), exacerbated by the pandemic. However, CSAs also seek to remedy precarity within food systems, through the application of agroecological principles, including the re-connection of socio-environmental sustainability. CSAs seek to challenge the status quo of agri-food.

Precarity and socio-environmental health is explored through the following: labour, environment, food supply and food insecurity, health (nutrition, mental health, wellbeing), and political-economic. CSAs cannot be the only or main answer to reducing precarity in food systems, but they do address many of the issues related to long, complex global food chains, and provide pointers and foundations for less precarious and more sustainable food systems.

Britain's World War II food policies — their planning, implementation, and results — and lessons that could help us transform today's food systems to be sustainable and just

- *Eleanor Boyle, Educator and Writer, Canada*

Alternatives exist to the wasteful and unsustainable food systems of today. One intriguing example from recent history comes from World War II Britain, where with vision from a Ministry of Food, and co-operation among millions of citizens, the nation pivoted from import-dependent and wasteful provision and usage, to instead focus more on local production, increased plant-based consumption, and virtually no food waste.

The wartime food programs were aimed to ensure that domestic citizens were fed adequately during the frightening and unpredictable circumstances of war. Ultimately, as well, the policies and practices helped the population get healthier and contributed to a decrease in socio-economic inequality. Physical well-being on the home front in WWII Britain was reflected in lower incidence of heart disease, tuberculosis, and diabetes, and improved maternal and child health -- a significant factor in which was the wartime diet that aimed to ensure basic calories and nutrients for everyone, where much of the population had previously been undernourished. Despite the terrible war and related suffering and death, domestic health outcomes were improved by a food system in which citizens consumed more home-grown vegetables, less meat, less sugar, and less highly processed foods.

Today COVID presents us with a painful example of social and economic disruptions. Towering over us, as well, is the climate crisis that can be seen as our 21st C war, which is already claiming territory, creating refugees, and threatening our ways of life. To address both, we can derive lessons from the example of wartime Britain that demonstrates the feasibility of food-system transformation and key elements necessary for societies to effectively mobilize food.

In this talk, I will discuss food problems arising from crises including the pandemic and conflicts such as war. I will outline challenges and evidence from wartime that can inspire food-system changes for health, sustainability, and justice.

The importance of small-scale farming and alternative food alliances for promoting resilient futures post-COVID-19 crisis in Brazil

- ***Felipe da Silva Machado, Federal University of Rio de Janeiro, Brazil***

The COVID-19 outbreak had significant effects on local food systems and food supply chains in Brazil and globally. A key finding is that the measures imposed in response to COVID-19 highlighted existing socio-economic inequalities among food system actors. The lockdown in Brazil restricted the production capacity of several small-scale farmers and resulted in loss of income, since street food markets were not operating at full capacity. On the other hand, local food systems continued to operate and were strengthened by social capital and adaptive capacities of small-scale farmers, reaching out to alternative farming networks.

Emancipatory food networks have emerged in rural-urban space where alliances are forged between urban consumers and farmers who offered local/regional products through alternative distribution networks and so have acted as an environmental and social counter-force to intensive global food systems (Marsden and Smith, 2005; Goodman *et al.*, 2011; Marsden and Morely, 2014). The research, based on small-scale farming resilience at the rural-urban interface, has been conducting on the regional context of the metropolitan area of Rio de Janeiro, Brazil, for over five years (Machado, 2020). Nevertheless, this paper draws on a more recent investigation that approaches the challenges to regional farming systems in the globalised and urbanised context of Brazil and alternative food alliances that emerged, exploring their changing dynamics in the context of the COVID-19 health pandemic, and highlighting future scenarios based on resilience theory.

The key point is the importance of promoting resilience by establishing political priorities to support small-scale farming systems based around fundamentally different logics to intensive global and food systems, and which, over time, generate more sustainable and equitable power relation systems for the purpose of regional and local quality agricultural systems, small-scale farming strategies, and resilient futures post-COVID-19 crisis.

To make food systems more resilient in the long-term, multiple factors such as the impacts of climate change, structural inequalities, and marginalisation of social actors within food systems must be considered. For small-scale farmers to contribute adaptive capacities to restructuring local food systems, a broader, holistic, multi-level strategy must be applied, which includes environmental factors, issues of local governance and inclusion. In the context of COVID-19 crisis, governments should strengthen local food production systems and consumption at a structural level and in line with a city-regional approach.

Conceptualising diversity in food systems

- ***Stefan Wahlen, University of Gießen***
- ***Bärbel Mahr, University of Gießen***

The current industrialised food system raises several challenges for more sustainable development. Contemporary dominant food systems follow a productivist paradigm emphasising the role of cost and standardisation. As a response, a myriad of diverse and alternative practices of food production, provisioning and consumption are mushrooming. Diversity might play a key role to establish more sustainable and resilient food systems. This contribution is interested in conceptualising diversity in food systems. Diversity in food systems relates to various actors and activities on different levels. Sustainable food systems might be enhanced by a more diverse diet according to seasons, which is more likely to cover nutrient needs as opposed to standardization and low variety in convenience products.

Food consumption is often understood as individual behaviour, not considering social, cultural and geographical diversity. With regards to food provisioning, diversity is documented by biodiversity in production, such as in organic farming. However, little is known about how diversity is conceived and valued in different ways across different food provisioning systems, such as mainstream supermarket provision, territorial food systems and catering provision. Lastly, it is also important to acknowledge diversity in food governance. Current governance approaches focus on food policies at (supra-) national scale, seldomly taking local food policies into account. For example, the role of diverse initiatives and approaches in local food councils have gained attention, but their role for a more sustainable food system needs to be clarified.

In this presentation we emphasise three key dimensions across the food systems actors (consumers, producers and distributors as well as governance stakeholders):

1. biological- environmental
2. socio-cultural
3. political-economical

Along these dimensions it is possible to distinguish agro-biodiversity, bio-cultural diversity as well as diversity in modes of organisation and coordination. Agro-biodiversity emphasises a variety and variability of species (animals, plants or micro-organisms) coming together in eco-systems. As such, agro-biodiversity is a key component to advance sustainable and resilient eco- and food systems. Beyond this well-established perspective of (agro-) biodiversity, food systems also need to acknowledge bio-cultural diversity, which might play a key role for more sustainable human-nature interactions. Such bio-cultural diversity can be embedded in traditional lifestyles and knowledge, such as for instance in land use or food cultures. Bio-cultural diversity hence extends biodiversity to cultural aspects of food, emphasising interconnected cultural rootedness of food consumption and production.

Diversity can also be detected in modes of organisation and coordination of and within food systems (on markets and in households). Variation can increase with niche innovations and pressure on a system to reshape and introduce change.

With this work we want to illuminate different aspects of food systems diversity which need to be considered to change the current food system towards a more sustainable and just food system providing healthy and culturally appropriate food.

Track E – Sustainable Sourcing and ethical consumption

Track Description

The COVID-19 pandemic has accelerated awareness around the impact of sourcing practices (Zhou, Chou and Tsai, 2020) on various actors in food supply chains. Firms have been confronted with the need to address new stressors, risks and threats. Workforces in lower income countries supplying the UK have often lacked access to sufficient PPE, job security and good hygiene facilities, exacerbated by the pandemic disruption (Fairtrade, 2021). There have been growing calls to reduce biodiversity loss and wider environmental degradation caused by farming and food production practices (OECD, 2020). For certain products, certification has proven valuable in facilitating lines of communication to keep trade moving, and working out where additional support is needed highlighting the embedded resilience such schemes can foster (Fairtrade Foundation, 2020).

At the same time, consumer's consumption patterns have shown a turn to consider the ethical and sustainable implications of their food and drink purchases (Chkanikove and Mont, 2021). There is evidence to show that more affluent segments of the population are making more sustainable choices, shifting brand dedication and seeking alternatives where products do not meet their values (Borsellino, Kaliji and Schimmenti, 2020). However, research has also shown that production standards and country of origin have lost importance for some consumers, with food safety instead a priority (Meixner and Katt, 2020).

Consumers have sought the nostalgia and sentiment from comfort foods in the pandemic, as well as opportunities to experiment, create and participate in consuming products with green credentials. Questions have been raised over the potential impact of shifting purchasing towards greener products, the role of the pandemic on the future of ethical production practices, and the implications for those in the production process (Foden et al., 2017; Moloney and Strengers, 2014; Lehner, Mont and Heiskanen, 2016).

Where now? A critique of pandemic consumer, business and government behaviours in relation to food in the UK

- ***Kate Barnett-Richards, Coventry University***
- ***Jill Timms, Coventry University***
- ***Lee Quinn, Coventry University***
- ***David Bek, Coventry University***

This presentation will explore and reflect upon secondary data collected during formative stages of the PhD process in order to give a preliminary position of future research. It will focus upon the impact of the coronavirus pandemic to consumers in the UK in relation to food purchases and more specifically ethical and sustainable choices that may be made.

Whilst for some consumers the pandemic brought with it financial benefits of reduced commuting costs, less spent on socialising and holidays, which meant disposable income increased. However, for many who were furloughed by their employers or were unable to access government help due to gaps in the emergency legislation (those who were self-employed for example) or found already stretched budgets stretched to breaking point when schools closed, and every meal and hour was spent in the home. These polar extremes brought to the fore the wealth divide in the UK and its impact upon both food systems as a whole and the everyday choices consumers make in relation to food.

Numerous examples of sudden spikes in demand and overall increases in interest and purchase of locally sourced products were seen at the start of the pandemic and although not all these products may fit the generally agreed definitions of local food it does show a pattern of increased consumer interest in products which may be seen as more ethical or sustainable. For example local high-street butchers saw much greater increases in demand for meat products as opposed to other retailers including supermarkets (Martin 2020), traditional milk deliveries saw increases in customers so large that many had to close their books to new customers to be able to keep up with demand (FarmingUK Team 2020) with continuous supply and the ability to adapt with no contact home delivery seen as a key drivers along with a growing interest in ethical and sustainable products amongst consumers (Sustain 2021, Borsellino et al. 2020).

In contrast the pandemic has also seen the use of food banks increase, including by those who would be considered key workers (Power et al. 2020) highlighting the issues of food insecurity across the country. The lack of continuing access to free school meals when schools closed to the majority of pupils in March 2020 caused outrage when pictures were shared on social media of packages which were intended as an alternative to the free school meals provided in school. The campaign by Marcus Rashford to give families the monetary equivalent of free school meals directly to parents caused the government to make one of multiple policy u-turns due to the public anger and backlash at what was seen as unethical behaviour to deny continuing access to this provision (Parnham 2020). In addition the recently published National Food Strategy which was commissioned by Michael Gove during his time as Environment Secretary was intended to be the first major review of UK food systems since the second world war and an opportunity for real structural change to be made,

however given the media focus on salt and sugar taxes for which there is little public appetite the government have already begun to distance themselves from the report and instead shift responsibility for change to individuals and businesses.

This presentation will therefore explore, challenge and question the longevity and of changes to how people buy, provision and consume food more ethically and sustainably beyond the pandemic.

Shifting the Dial for Workers: Developing and Implementing a new Standard for Ethical Trade and Responsible Sourcing

- ***Fiona Humphries, Technical Manager – Ethical Trade & Responsible Sourcing, BRC-Global Standards (BRCGS)***

BRCGS is known for its robust Product Safety Standards which are used by brands and retailers to assure the quality, safety and legal compliance of food and non-food products manufactured by their suppliers. In 2019, BRCGS diversified by launching a new Global Standard for Ethical Trade & Responsible Sourcing in response to growing calls for a more robust approach to managing and protecting the health and safety, employment and human rights of workers. The ETRS Standard offers the flipside of the product safety coin, assuring that the people involved in the manufacture of products are protected, making sure they work in safe environments where they are treated fairly, free from exploitation or discrimination. It is underpinned by the same compliance management framework used for other BRCGS Standards. In addition, the standard is going through benchmarking against the Consumer Goods Forum's Sustainable Supply Chain Initiative. By achieving the SSCI benchmark, the ETRS Standard will have a similar rubber stamp of excellence that has been achieved for other BRCGS standards through the Global Food Safety Initiative. This presentation will outline how the ETRS Standard works and will include a case study from one of the first sites to achieve certification.

Drivers and barriers for poultry consumption in India

- ***Lavinia Scudiero, Royal Veterinary College, University of London***
- ***Mehroosh Tak, Royal Veterinary College, University of London***

Adequate consumption of poultry is important to overcome the triple burden of malnutrition in India. However, although poultry is one of the fastest-growing agricultural sectors in the country and the demand for poultry is said to be growing, the per capita consumption of poultry is very low. Diverse factors affect demand. We analyse poultry consumption in the Indian population using the latest available National Sample Survey data (2011-2012). Summary statistics and spatial analysis estimates are reported to characterise the distribution of household poultry consumption at the rural and urban levels. We then use a series of regressions to explore identified socio-economic and food system drivers of consumption in India. We find that more than half of the households present in our sample do not consume poultry in India and the average intake is far below the recommended benchmark for a healthy diet of 11 Kg of chicken and 180 eggs per capita per annum. Results show that poultry consumption is especially defined by the geographical location of the household. It is lower in western and northern India and higher in southern India. Among the households that consume poultry, consumption is higher where households are urban and headed by heads with higher education levels. Chicken consumption is higher where households involve agricultural livelihoods, while egg consumption where households are headed by females. Religion is an important correlate: Christian and Muslim households are associated with higher consumption patterns while belonging to Hindu, Sikh, Jain and Zoroastrian groups is associated with lower consumption. Chicken consumption varies across social groups as upper castes are associated with lower intake quantities relative to Scheduled Tribes groups. Egg consumption has a similar pattern across households located in the different caste groups. In a country where poultry producers are adapting rapidly to meet increasing consumer demand, the study highlights important socio-cultural factors that drive poultry consumption. Rapidly changing poultry production systems can generate risks for public health. Understanding demand determinants is crucial to support Indian poultry sector policy planning.

The Sustainability of Beef Supply Chain with RAPBEEF

- ***Aries Susanty, Diponegoro University, Indonesia***

Nationally, there has always been a gap between the demand for beef and its supply although supply growth is proportional with demand growth and even exceeds it in some regions in Indonesia. This research study aims to measure the sustainability status of the beef supply chain and applies the developed measurement system to a specific beef supply chain by identifying suitable indicators and their scale. Moreover, this research study provides some recommendations for the improvement of the sustainability status of the beef supply chain.

Materials and Method: In this research study, 11 and 9 indicators, respectively, were analyzed to assess the sustainability status of the beef supply chain at the farm and slaughterhouse chain levels. A Rapid Appraisal for Beef Supply Chain (RAPBEEF) was applied to rapidly assess the sustainability status of beef supply chains using Multidimensional Scaling (MDS). The Delphi method was utilized as an iterative process to collect data and obtain consensus of experts' judgments regarding the policies that should be implemented to improve the most sensitive indicator affecting the economic, social, and environmental dimensions.

Result: Analysis of ordination with MDS shows the regional sustainability index value for multidimensional approaches of beef cattle farms and beef slaughterhouses. The sustainability index value for beef cattle farms was 56.14 (moderately sustainable), 48.02 (fairly unsustainable), and 48.77 (fairly unsustainable) in Semarang, Sragen, and Boyolali, respectively. Moreover, the sustainability index value for beef slaughterhouses was 47.05 (fairly unsustainable), 54.83 (moderately sustainable), and 54.19 (moderately sustainable) in Semarang, Sragen, and Boyolali, respectively. Policy recommendation was focused on the basis of the results of leverage analysis, which highlighted the most indicative factor affecting sustainability for each dimension.

Conclusion: Measurement results revealed that the achievement of beef supply chain sustainability requires targeted efforts through the deployment of several policies as the current status of sustainability in beef farms and beef slaughterhouses was only inclined toward moderately sustainable and fairly unsustainable. Although all the surveyed regions in this study can meet the regional needs of beef meat on their own and even distribute the excess to other regions, none of the beef supply chains of the surveyed region indicated good sustainability.

Edible, Sustainable and Ethical Insects: Devising an Export Roadmap from Thailand to Europe

- ***Pattanapong Tiwasing, Coventry University, UK***
- ***Sirithon Siriamornpun, Mahasarakham University, Thailand***
- ***Jennifer Ferreria, Coventry University, UK***
- ***Natthida Weerapreeyakul, Khon Kean University, Thailand***
- ***Alongklod Tanomtong, Khon Kean University, Thailand***
- ***David Bek, Coventry University, UK***

Eating insects, including crickets, has demonstrated the benefits for human consumption and environmental impact as well as economic development. The global market for edible insects is expanding rapidly and there is potential for significant growth into markets, especially the EU. Thailand is the world's largest producer of edible insects, supplying into domestic and regional markets. More significantly, Thailand has been authorised by European Commission as one of the third countries that can export edible insects to the EU market. Subsequently, exporting edible insects and their derived products can offer greater value added for Thai exporters and producers.

However, they often lack knowledge of the protocols of international trade and export regulations for insect-based products. Therefore, this study aims to provide key knowledge on EU food regulations and import conditions to underpin the development of a roadmap to help enable Thailand's edible insect industry to achieve export readiness. We suggest that edible insect businesses and producers need to follow two main EU import conditions for insects as food: 1) Novel Food Regulations and 2) Food Safety Standard. Also, we recommend that Thai insect farming should comply with Thai Good Agricultural Practices (GAP) to ensure food products reach processing facilities in compliance with EU food and safety regulations.

Track F – Decision making in Food Supply Chains: Transitioning to a circular economy

Track Description

More circular models of living and eating are growing traction in their adoption by businesses and governments (Bek and Lim, 2018). The pandemic has been viewed as an opportunity to ‘build back better’ with circular economy approaches key to a lower carbon economic recovery plan (Ellen MacArthur Foundation, 2020). Understanding the potential of these solutions and navigating the risks faced remains a priority for the future of food.

Potential solutions such as maximising the composting of by-products and green waste could save 1.7 billion tonnes of CO₂ annually. Moving to regenerative systems of food production can minimise the impact on natural inputs, such soil condition, to yield savings in operation costs. Diverting surpluses away from landfill and incineration driven by the creation and increase in taxes is one ported solution (Feedback, 2020). More research is needed to better understand the decisions being made in food supply chains and how, at a practical, operational and strategic level, circular economy principles are part of this process

Greater insight on the type of analytical methods required to understand the proliferation of more circular processes in this sector is critical. For example developed mathematical models to reveal network design, distribution and efficiency is one effective approach. This tack seeks to open this topic further by exploring how various approaches, such as operations research, forecasting, data mining and machine learning amongst other approaches, are revealing important insights with regards to decision making in food supply chains and the transition to a circular economy.

Green food supply chain optimization using multi-objective mathematical modeling and simulation-based optimization.

- ***Nikta Babakhani, Department of Industrial Management, Faculty of Management, University of Tehran***
- ***Seyed Mojtaba Sajadi, School of Strategy and Leadership, Faculty of Business and Law, Coventry University, UK***
- ***Mohammadreza Taghizadeh-Yazdi, Department of Industrial Management, Faculty of Management, University of Tehran***

One of the main challenges from the beginning of the creation, is supplying food as one of the crucial needs of human beings. Meat and poultry have an undeniable role and a big share in the food supply. Due to the vast and variety of different activities in the food supply, supply chain networks have been discussed these days. However, in today's competitive world, companies need to pay attention to environmental issues, beside a profitable supply chain. Consequently, the design and optimization of the green food supply chain especially in perishable food in order to minimize environmental impact, minimize total cost, and maximize the utilization of the resources 'capacity.

In the present study, a green four echelon supply chain (supplier, manufacturer, retailer and customer) is discussed regarding the production of perishable food especially meat and poultry. A multi-objective mixed integer linear programming formulated to optimize three objective functions simultaneously including minimizing the total fixed and transportation costs, minimizing the total CO₂ emission released from the transportation network, and maximizing the total utilization of capacities in suppliers, manufacturers, and retailers.

In the first phase, a multi-objective mathematical model with the augmented ϵ -constraint method in GAMS software with specific assumptions and constraints is solved and the results are shown in order to reduce green supply chain costs and increase profits and productivity. In the next phase, simulation with the help of ARENA software was introduced to introduce the problems of uncertainty and its greater similarity with the real world. The complexity of solving these problems, due to the uncertainty of the problem parameters and its time consuming, makes it possible to use simulation-based optimization.

Decision Making for Resilient food supply chain using operations research; a survey.

- ***Sara Ghanbari, Shahed University***

Food supply chains are exposed to various challenges such as increased supply and demand uncertainty besides unexpected disruptions. These disruptions include natural hazards, industrial accidents, long supply lead times, perishability, seasonality, and pandemics. The crucial role of designing a resilient food supply chain to cope with mentioned challenges is inevitable.

This study focuses on the studies conducted from 2014 to 2021, which considered resiliency to design a food supply chain using mathematical modelling. This analysis aims to review the existing literature on resilient food supply chains decision making and bring an implication about how to mitigate the impact of external and internal disruption risk in a food supply chain. This research classifies some of the many works in this field according to three primary focus areas: logistics, risk management, and food safety. This study examines risks of the food supply chain, including disruption and operational in various food industries.

Other possible challenges such as perishability, natural hazards, industrial accidents, or epidemics are considered in this analysis. The type of adopted resilient strategies to cope with uncertainties is another considered aspect. Another perspective is whether the model considers uncertainties, or it is deterministic. Researchers face these uncertainties with different mathematical approaches such as stochastic programming, fuzzy programming, and robust optimization. In addition, this research categorizes research due to different uncertain parameters in their mathematical model.

Results obtained from this review offer broad implications and ideas for researchers to design resilient food supply chains to strengthen the network and thus reduces the impacts of unavoidable risks.

Circular economy of spent coffee ground as oyster mushroom cultivation: Urban agriculture strategic

- ***Soni Sisbudi Harsono ,University of Jember)***

Coffee is a beverage that people in the world widely consume. In Indonesia, people often drink coffee in the morning so as not too sleepy and fresh. Some consume coffee when they should get overtime to complete the task. Waste coffee grounds raise a new problem. That meets landfills. Coffee also contains carbon later in the day. A pile of coffee grounds can lead to the greenhouse effect. Many may think that the two teaspoons of coffee alone may not have an impact on the environment. However, if left alone, the waste coffee grounds we consider harmless earlier will cause damage to the environment. Waste alone can provide both positive and negative impacts. Therefore, in the age of technology, demolition is expected to positively impact and reduce and even eliminate the negative effect of this waste material. Inside, the coffee drinks have a potassium content, magnesium, and copper phosphorus that can provide excellent nutrients for land so that the pulp plants from coffee drinks can be more fertile.

To use the coffee pulp as a nutrient in plants is relatively easy, not necessarily washed, because if passed can eliminate the content contained in the pulp from a coffee drink. When the remaining pulp from the coffee drink is not reusing, it can be dry to become dry powder and then sprinkled in the plants you want to plant. The way is also relatively easy to spread the pulp that has been dried from the coffee powder at the top of the ground plants evenly. After that, to get a better result, the soil of coffee-sprinkled plants is covered with approximately thick dirt ranging from 2 to 3 cm so that the pulp is not soluble in water.

Mushrooms are incredibly well suited for indoor urban agriculture. Unlike some other urban food crops, mushrooms do not require gardens or greenhouses and can grow inside repurposed rooms all year round. Most impressive is the unique opportunity they provide to reuse urban-generated wastes, such as used coffee grounds. Mushrooms, specifically the Oyster *Pleurotus ostreatus*, can use these grounds as a nutritional substrate to grow and fruit on. This project will explore the technical feasibility of developing gourmet pearl oyster spawn to inoculate used coffee grounds in an urban environment to tackle unemployed people during Pandemic Covid 19.

A review on models and analysis methods of decision making in food supply chains.

- *Ehsan Khajeh, Coventry University*

Paving the path of organisational success, top managers need to be well aware of the resources of all kind and goals of the organization. This will not happen only if a noteworthy strategy is designed. Owing to the fact that the problem of strategy recognition is one of the significant challenges for organizational success. Among different supply chains, food supply chains are complex, global networks, creating pathways from farms to consumers, involving production, processing, distribution, and even the disposal. Consumers' expectation of year-around availability of fresh food products has encouraged the globalization of food markets. In this regards, finding the gaps in the past and current system in food supply chains is crucial especially considering sustainability concerns. In this paper, we review and evaluate all research methodologies of decision making in food supply chains considering the articles in high-ranking journals from 2010 until May 2021.

To identify decision making in food supply chain papers, a careful selection of key words was constructed based on earlier works. 444 research articles which are published in high-ranking Journals during mention period are collected from major management science publishers and database named Scopus. The critical review discusses the current status of research in decision making for food supply chains and also it will be compared with the studies focused on decision making for the food supply chain in the circular economy context. This paper discusses possible paths for research progression in the future.

We present a comprehensive review of the definitions, classifications, objectives, techniques, decision variables and solution methods of the decision making in food supply chains considering sustainability. The results of review demonstrates that how decision on a food supply chain could achieve the circular economy targets.

Development of Red Seaweed Carrageenophytes-based Biopolymers as Sustainable Food Packaging Materials.

- *Danar Praseptiangga, Universitas Sebelas Maret*

Nowadays, there is a growing interest in developing food packaging materials using natural polymers or biopolymers because of the need of consumers who are interested in purchasing safe, high-quality, long-shelf-life-products, and at the same time, those which are environmentally sustainable. The biopolymers thus have the opportunity to significantly contribute to the circular economy approach by providing a wider range of disposal options that have the potential to reduce the negative environmental impacts of food packaging.

Biopolymers have been studied regarding their film-forming properties to produce biodegradable and/or edible films intended as food packaging and active ingredient carriers. Film-forming materials can be utilized individually or as mixed composite blends. Kappa and iota carrageenans are polysaccharides-types containing sulfate groups extracted from red seaweed carrageenophytes which can be used as materials to form film matrices. In addition to its abundant availability in Indonesia and suboptimal utilization, the properties of carrageenan are very suitable to be applied as film-forming materials.

Besides exhibit several advantages due to their film-forming properties, however, carrageenan-based films demonstrate several weaknesses when applied as food packaging materials, such as relatively low mechanical and water vapor barrier properties, as well as poor protection against UV light. To overcome these weaknesses and improve the film properties including providing UV blocking and antimicrobial features while maintaining the biodegradable characteristic, nanoparticles have been widely incorporated into the various biopolymer-based films, forming a bio-nanocomposite film, a multiphase material formed by two or more elements with a natural polymer as a continuous phase or matrix and nanofiller as a discontinuous phase.

Different types of nanoparticles have been incorporated into biopolymer-based films to improve their characteristics, including silicon dioxide, zinc oxide, and titanium dioxide, which provide excellent features such as antimicrobial activity, water vapor, and oxygen barrier enhancement, and UV protection. Our studies showed the incorporation of SiO₂ and ZnO nanoparticles into semi-refined iota carrageenan-based film has reinforced the film's multifunctional properties with enhanced water vapor barrier properties, UV-screening, and antimicrobial activity, suggesting a promising active food packaging material and as an excellent alternative to petrochemical-based food packaging.

Scenario-Based Simulation Optimization of Food Production System Considering Bottlenecks and Preventive Maintenance Case Study: A Tomato Paste Factory.

- ***Seyed Mojtaba Sajadi, Coventry University,***
- ***Maryam Mirzaeesadr , Islamic Azad University, Iran***
- ***Farshid Salehi, Islamic Azad University, Iran***

Determining the schedule and sequence of operations in production issues is one of the key factors of success in any production organizations and plays an effective role. Production schedule prevents the accumulation of capital, reduces waste, reduces or eliminates unemployment of machinery, and strives for better use to ensure timely response to customer orders and to supply raw materials and parts on time. Therefore, the main purpose of this study is to investigate the operational barriers of the production to increase productivity, reduce costs and reduce lost sales.

To achieve those goals, firstly, a simulation model was created in the relevant software with full knowledge of the process. Then the production data in the form of timing, failure density functions, routing of parts, etc. are updated in the software. Then, with the help of the experimental design, the variables in the repair and maintenance section are changed and the balance of the multi-product production line is followed according to the demand patterns. This design is done with the help of bottleneck analysis, which is done with the help of reports of the number of parts in the queue, which is one of the outputs of the simulation software. Then different scenarios in the software are executed in the form of program scenarios and the best conditions are extracted. The above method was performed in one of the food factories that operate in a tomato paste factory. Then, the model was validated by two paths of experts and statistical techniques (analysis of variance) by comparing the simulation data on the planning horizon and the existing data analysis after execution, the model was validated with 92% accuracy (P-Value). The 8% deviation in p-value due to the shortage of raw materials caused by the embargo has not made it possible to predict based on previous data.

The results after implementation show an increase of 7% in the production comparing with the previous year. The proposed method was also used to calculate the number of productivity changes and productivity compared to the base year. An improvement of about 12% proved the efficiency of this method. Therefore, this method applies to food factories that have advanced equipment and can increase production based on selecting the best scenario for maintenance and increase productivity through simulation-based bottleneck monitoring, and thus reduce the cost price.