



**New
Landscapes:
Fashion,
Textiles &
Technology
Catalyst
R&D Grant
Scheme**

The British Council, and UAL Fashion, Textiles and Technology Institute, shaping the future of global fashion, textiles and related technologies

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A smallholder farmer with her cotton harvest in Gaji village in Indonesia

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1 Executive Summary



Sisal fibre harvesting in Kenya

Executive Summary

Global drivers, including the Covid-19 pandemic and climate change, have accelerated the need for the fashion, textiles and related technologies (FTT) industries to re-think and re-evaluate their impact on both people and planet. There has never been a more important time to explore the sector's relationship with its workforce and the environment, and to address the need for radical transparency and sustainability across the whole value chain.

Examining the foundations of these industries, from operating models to their wider purpose, brings challenges but also opportunities. With new fashion systems emerging across the world, there is huge potential to create real and lasting change. Through collaboration on a global scale, the FTT sector can build a fairer, more inclusive, and more responsible future.

To meet this opportunity for change, in early 2022 the **British Council's Architecture Design Team and Fashion (ADF) Team** in partnership with the University of the Arts London, **Fashion, Textiles and Technology Institute (UAL, FTI)** piloted **New Landscapes: Fashion, Textiles and Technology (FTT) Catalyst R&D Grant Scheme**. The programme aimed to drive research and development (R&D) and nurture international co-operation around more responsible and socially engaged FTT industries. It was designed to foster new ideas that help shape the future of sustainable fashion and textiles globally, and support the cultural, social and environmental values of the FTT sector.

This report presents the findings from the **New Landscapes pilot R&D programme**, a pioneering scheme to support and enable R&D collaborations between fashion and textile small to medium-sized enterprises (SMEs) in the UK and Official Development Assistance (ODA) countries. By facilitating the provision of much-needed guidance and support, the scheme aimed to aid growth for sustainable businesses within marginalised communities, and, in turn, promote global prosperity at a sustainable level.

The **New Landscapes pilot R&D programme** offers a novel template for UK and ODA SME knowledge exchange schemes. The programme also met some of the United Nation's Sustainable Development Goals (SDGs), including tackling extreme poverty, creating resilient infrastructure, and ensuring sustainable consumption and production patterns.

The impact that the **New Landscapes pilot R&D programme** has made within the awarded ODA countries is outlined (p.6–7), along with case studies detailing each of the awarded projects. The report additionally explains the background to co-creating the **New Landscapes pilot R&D programme** methodology (section 2, p.10), a review of the successful and more challenging elements of the scheme, plus a review of next steps and potential methods for scaling up the programme.

The report also includes case studies of the R&D focus areas (section 3, p.16), and the innovative projects undertaken, ranging from the development of sustainable yarns to virtual garment and fabric sampling methods, and repurposing polyester to create zips and garment fastenings to the promotion of circular denim practices.

The funding call in brief

35

Total applicants

5

Awarded projects

10

SMEs supported

4

Months duration

£100k

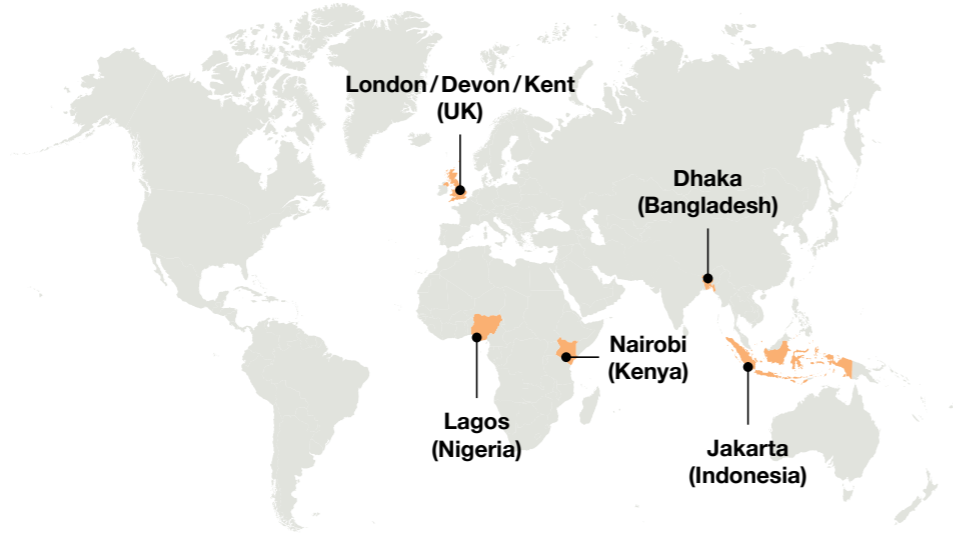
Funding provided

£6k/£14k

(up to) in-kind specialist support received by awardees

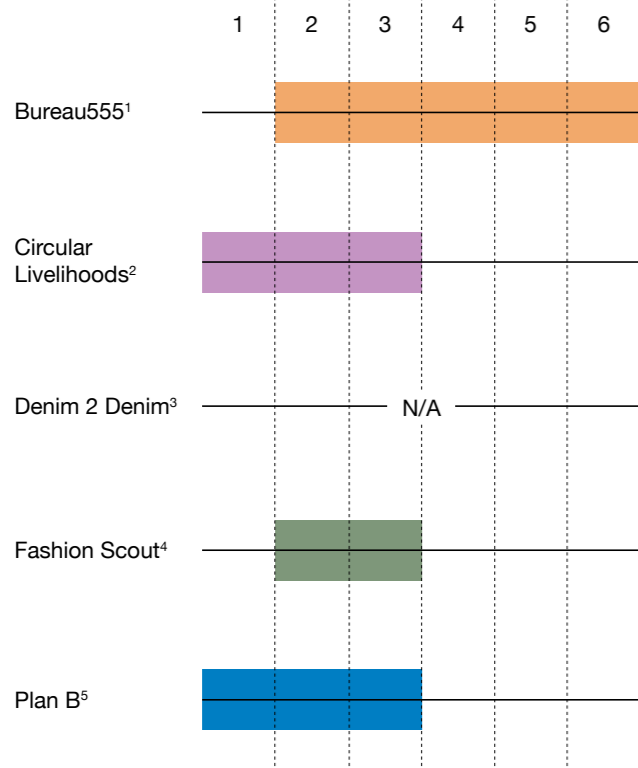
Open international funding call for applications, shortlisting and final proposal pitches to a commissioning panel

Selection process

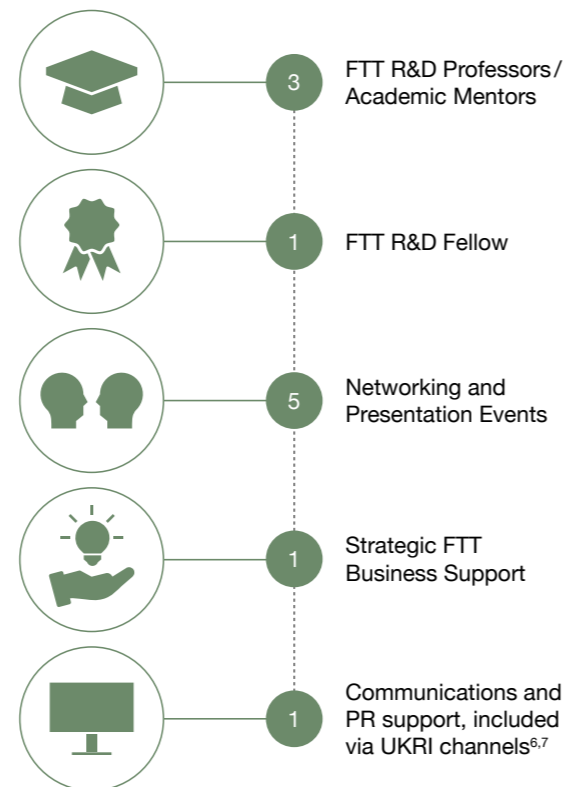


Awardee SME ODA and UK locations

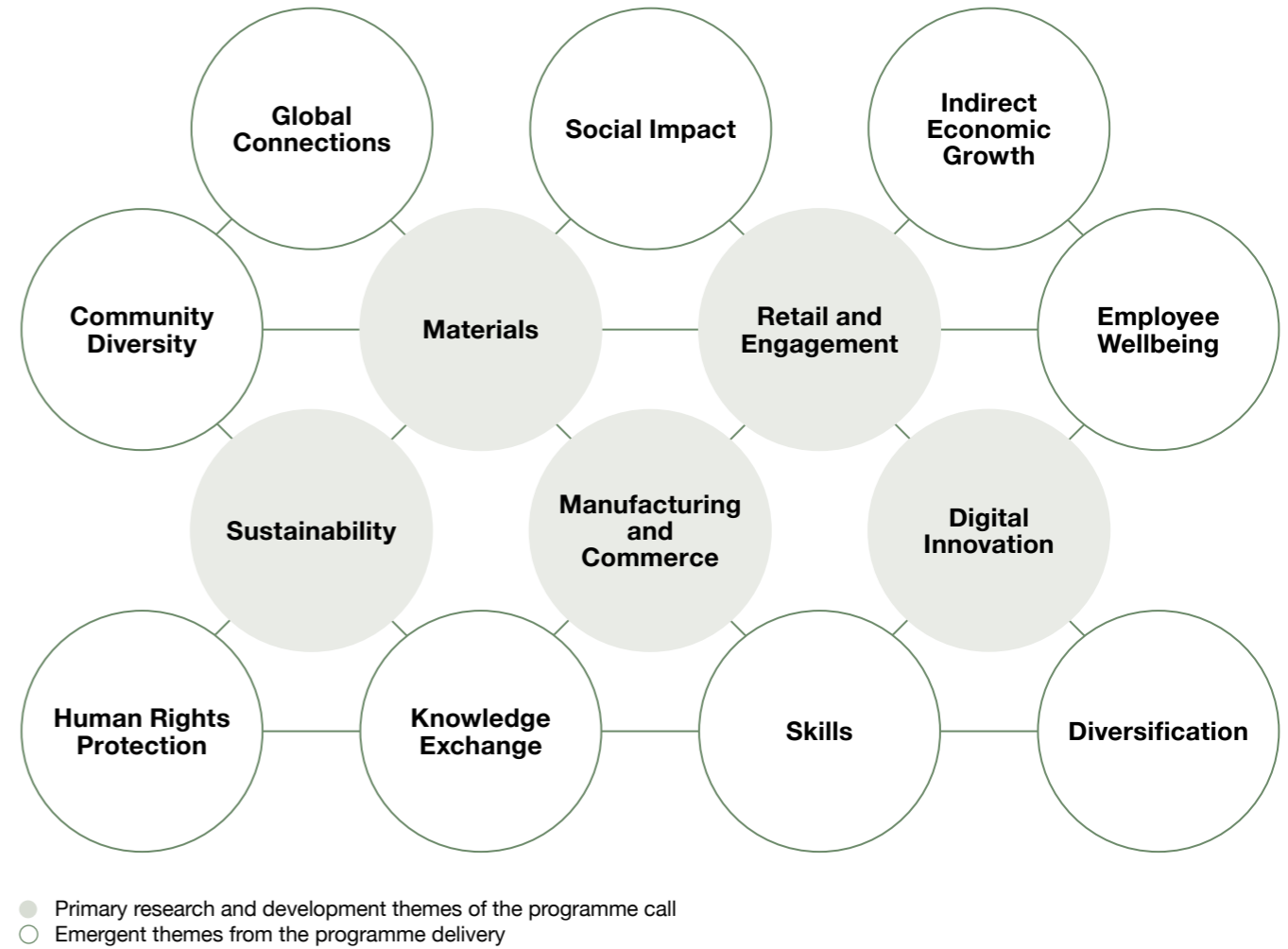
TRL (Technology Readiness Level achieved) approx.



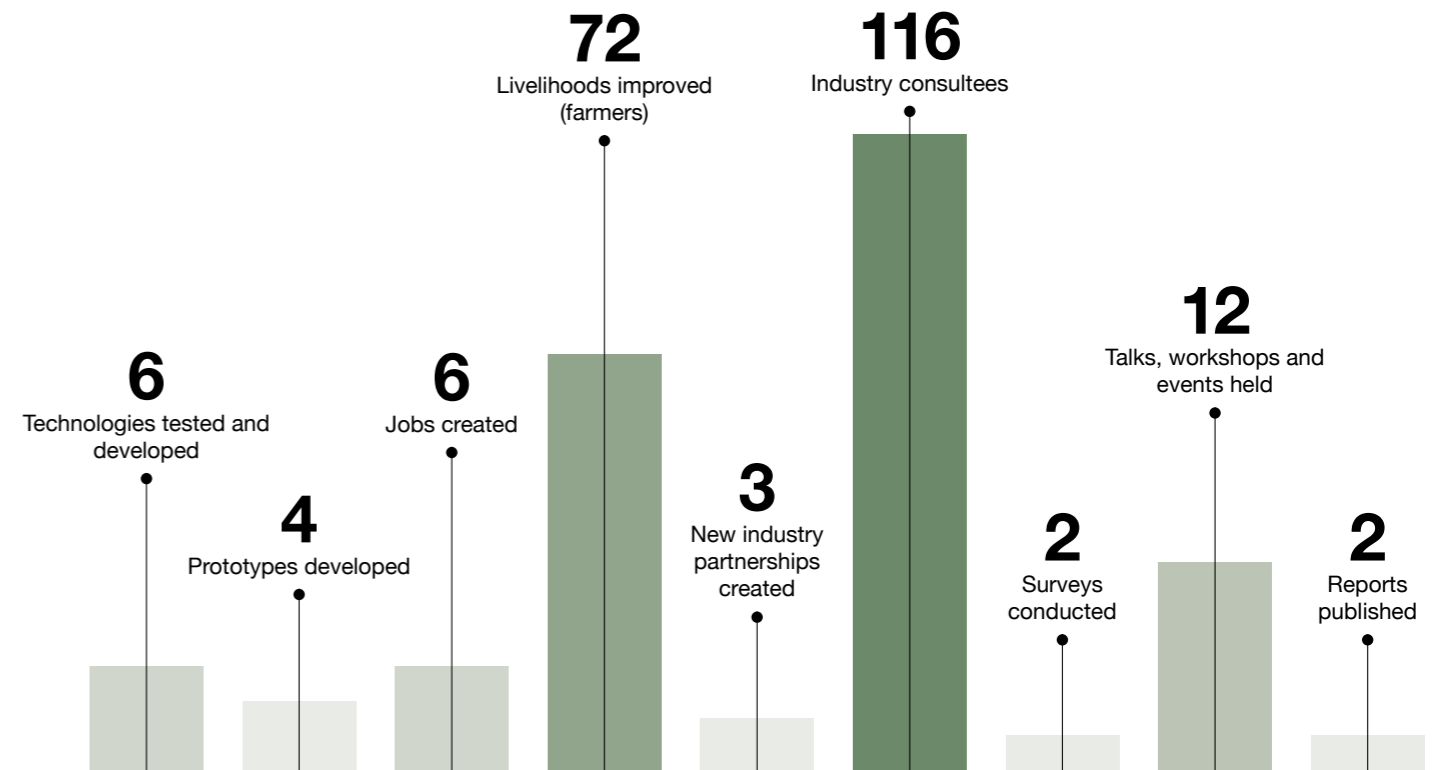
The programme provided



Emergent themes



Impact



“The Fashion, Textiles and Technology Institute provides an ideal portal and partnership for the joint pilot programme with the British Council. The scheme aims to nurture international co-operation around responsible and socially engaged fashion and adjacent industries across textiles and technology. This initiative will support new ideas shaping the future of sustainable fashion globally – in addition to building longer-term initiatives with the Institute, and our East Bank partners in Stratford.” – Sevra Davis, Director of Architecture, Design and Fashion, British Council

“Responding to global drivers, the New Landscapes R&D programme stimulates international collaboration to re-evaluate the industry’s relationship with climate change, the environment, and the need for radical transparency and social responsibility. It creates a culture among the sector’s SMEs and young designers of exchanging methods of designing and producing in a more sustainable and socially engaged way. We’re excited to be working with British Council and our five innovative SME partnerships to develop their ideas showcasing the future mindset of the Fashion, Textiles and Technology sector.” – Professor Jane Harris, Director of the UAL Fashion, Textiles and Technology Institute (FTTI)

1 bureau555.com
 2 rumahsukkhacitta.org/circular-livelihoods
 3 fashionrevolution.org/wp-content/uploads/2022/04/Denim-to-Denim-PROJECT-REPORT-.pdf
 4 fashionscout.com; kikoromeo.com
 5 projectplanb.co.uk; yester.com.hk
 6 creativeinnovation.uk/stories/ual-sustainable-fashion-catalyst-programme
 7 arts.ac.uk/about-ual/press-office/stories/five-uk-and-overseas-small-business-partnerships-in-100k-sustainable-fashion-textiles-and-technology-catalyst-programme



2 Development of an FTT SME R&D Programme

Away to Mars (ATM), an SME in receipt of R&D funding from the UAL Business of Fashion, Textiles and Technology Creative R&D Partnership. ATM is a co-creation, crowd-sourcing fashion platform

Development of an FTT SME R&D Programme

The **UAL Business of Fashion, Textiles and Technology (BFTT)** is one of nine UK-wide Creative R&D Partnerships⁸ as part of the £80m UK Creative Industries Clusters Programme (CICP)⁹, hosted by the Arts and Humanities Research Council, (AHRC 2018-2023)¹⁰.

The BFTT project convenes world-class research talent with leading industry, SMEs and organisations from across the UK, spanning the entire industry, supporting apparel, textiles and technology businesses in the use of research and development (R&D) as a mechanism for achieving sustainable innovation and growth.

Over time, the BFTT has developed a bespoke **SME R&D programme**¹¹, drawing from the UK Government's longstanding Knowledge Transfer Partnership (KTP) scheme¹² with adaptations to specifically meet the specialist requirements of the fashion/wider apparel, textiles and related technology (FTT) businesses.

The following adaptations provide the necessary support for FTT businesses wishing to engage in R&D including access to:

- bespoke specialist expertise to scope and catalyse FTT research and development
- leading cross-disciplinary research spanning design, STEM, anthropology, social science and business studies
- hybrid FTT business and academic support, to advise on the various stages of developing an R&D proposal, including legal and IP interests
- project leads of specialist post-doctoral and/or industry equivalent level
- R&D for micro businesses, in addition to SMEs, and a lower percentage of required match in-kind funding as a minimum towards receipt of awarded R&D funding
- peer-to-peer learning, networking and knowledge exchange opportunities
- future consumers for testing and prototyping R&D
- advice on follow-on funding for further R&D; academic industry partnered research funding; alternative forms of investment.

Core to the BFTT scheme is an established transdisciplinary academic hub at University of the Arts London, which intersects a network of five higher education institution partners.¹³ Each provides differing complementary specialist research experience, which broadens the R&D scope, academic support and provision across: sustainable design; environmental science; materials engineering and manufacturing; polymer chemistry; anthropology; business and management; computer science; digital design and production. The BFTT acts as a gateway, enabler and delivery partner for the companies within the programme.

⁸ The UAL BFTT HEI partnership includes Loughborough University (LU); University College London (UCL); Queen Mary University of London (QMUL); University of Leeds (UoL); University of Cambridge (UoC) and the Victoria and Albert Museum (V&A). <https://bftt.org.uk/>

⁹ Creative Innovation is an emergent platform to showcase outputs and impact of the CICP Programme: creativeinnovation.uk/

¹⁰ ukri.org/councils/ahrc/

¹¹ bftt.org.uk/sme-support-programme/

¹² ktp.innovateuk.org/

¹³ The UAL BFTT HEI partnership includes Loughborough University (LU); University College London (UCL); Queen Mary University of London (QMUL); University of Leeds (UoL); University of Cambridge (UoC) and the Victoria and Albert Museum (V&A).

Across three calls for applications between 2019-21, the BFTT SME R&D programme attracted approximately 250 funding applications, of which approximately 40% were viable (fundable) proposals. The process also identified the potential of aligning the right type of funding opportunity with specialist FTT SME R&D support. To date, the BFTT programme has funded and provided bespoke provision to 35 SMEs via the scheme. The scheme meets EDI requirements, and has also attracted a high number of female entrepreneurs.

2.1 The value of the BFTT SME R&D programme methodology

1. The scheme aims to support a company beyond general financial; voucher; or business advisory schemes.
2. The scheme requires SMEs to propose a pre-defined R&D challenge that would be difficult to achieve without the scheme's support.
3. The scheme embeds R&D into a business, via a competitive and in-depth process of proposal development, testing, followed by an industry panel review.
4. The scheme addresses sustainability as a primary requirement for all applicants.
5. The scheme supports recruitment and employment of a high-level project lead, a postdoctoral researcher (or a researcher with equivalent industry experience).
6. The required level of experience for the project role fundamentally enables the research or R&D to operate at a higher level.
7. The R&D is fully documented; and prepared for commercialisation; and/or commercialised.
8. The scheme matches SMEs with specialist Academic Mentor/s according to the skill requirements of the R&D proposal.
9. The Academic Mentor supports the development of the proposal and works directly with the company to support recruitment of the Project Lead.
10. SMEs funded by the scheme have also improved their ability to identify and develop other types of R&D, and funding proposals.
11. Those not funded benefit significantly from the mentoring support throughout the application process, which makes more viable engagement with other funding mechanisms, including the UK KTP scheme.
12. While the scheme focuses on the FTT sector, it also lends itself to the wider creative industries and associated technical R&D agendas.

2.2 The New Landscapes R&D Programme methodology

The **New Landscapes pilot R&D programme** draws from the **BFTT SME R&D programme**. It was developed to foster new ideas around the future of sustainable and socially engaged fashion/apparel and adjacent industries across textiles and technology, as well as provide access to specialist academic research, expertise and facilities. In particular, the programme aimed to facilitate international co-operation with partnerships between SMEs and HEIs in the UK and SMEs in Official Development Assistance (ODA) countries.

Spanning the UK, South and Southeast Asia, and Sub-Saharan East and Northwest Africa, the five UK SMEs and their overseas partners worked on R&D projects over a four-month time frame (January–April 2022), supported by the UAL FTTI.

Each of the five projects had a strong focus on sustainable innovation across manufacturing and commerce, materials, and digital practices, with the potential to generate new opportunities for international collaboration, particularly in the wake of the Covid-19 pandemic.

R&D took place in the UK and overseas across the projects, under the academic guidance of the FTTI.

The five R&D focus areas include:

- **Reduction of textile waste through the implementation of 2D and 3D digital garment sampling skills.**
- **Development of a circular yarn that supports the working practices of textile communities.**
- **Establishment of a virtual platform to support circular denim practices.**
- **Re-purposing of polyester material to produce circular garment fastenings and accessories.**
- **Development of a durable and sustainable textile made from sisal blended fibres.**

The structure of **New Landscapes pilot R&D programme** connects each of the parties outlined below with a key participating role in the project:

- **British Council:** provided the project funding for this pilot scheme
- **UAL Fashion, Textiles and Technology Institute (FTTI):** provided project management, access to transdisciplinary academic research, and guidance
- **UK Company Lead:** the key contact at the UK SME carrying out the project work
- **ODA Project Lead:** the key contact at the ODA SME carrying out the project work
- **FTTI Project Lead, Academic Mentor, UK Company Lead, and ODA Company Lead** maintained a partnership approach throughout, linking in associate communities as appropriate.

Jocelyn Whipple
Totnes, UK

Tim Cross
Plymouth, UK

Gabrielle Shiner-Hill
London, UK

Zoë Powell
London, UK

Martyn Roberts
Ramsgate, UK

Sola Idowu
Lagos, Nigeria

- Sustainability
- Materials
- Manufacturing & Commerce

Iona McCreath
Nairobi, Kenya

- Sustainability
- Materials
- Manufacturing & Commerce

Mahmudul Hoq
Dhaka, Bangladesh

- Sustainability
- Advanced Materials
- Manufacturing & Commerce

Nusrat Mahmud
Dhaka, Bangladesh

- Sustainability
- Digital
- Manufacturing & Commerce

Bertram Flesh
Jakarta, Indonesia

- Sustainability
- Materials
- Manufacturing & Commerce

3 New Landscapes Pilot R&D Programme: Projects and Partners



A group of seamstresses sewing woven shirts in a factory in Bangladesh. Azim Group

3.1 Circular Livelihoods – Creating a circular yarn from regenerative cotton and textile waste in Indonesia

A project working with smallholder farmers and traditional weaving communities is prototyping a new type of circular textile yarn, using a blend of regeneratively grown cotton and textile waste.

- Zoë Powell, London, UK + Bertram Flesch, Jakarta, Indonesia
sukkhacitta.com
zoepowell.com
rumahsukkhacitta.org/circular-livelihoods

The production of a cotton textile typically has significant impact on the environment at both the very beginning and end of its life. Intensive farming of cotton requires fertiliser, pesticides and a high volume of water¹⁴. Textile waste is very often incinerated, causing air pollution and creating carbon emissions that contribute to climate change.

The **Circular Livelihoods** project aims to tackle both issues by exploring the potential for a circular yarn made from cotton grown on more environmentally friendly regenerative farms, combined with recycled plant-fibres retrieved from textile waste.

Based in Indonesia, one of the fastest growing consumer markets for textiles, the project is led by London-based textile designer-maker and independent researcher Zoë Powell, together with co-founder of social enterprise SukkhaCitta, Bertram Flesch, in Jakarta.



Fig. 1 Application of natural pesticides



Fig. 2 Natural pesticides used in regenerative farming, salt and clove

“Indonesia faces a growing problem with textile waste, where it is very often burned, polluting the air as well as people’s lungs. But many farmers and rural artisans, such as weavers and spinners – particularly women – rely on this industry,” says Zoë Powell. “The Circular Livelihoods project aims to reduce the environmental impacts of cotton and textile waste, as well as provide positive economic and social impacts to local communities

14 doi.org/10.1017/S1742170520000356



Fig. 3 A smallholder farmer with her cotton harvest in Gaji village, Indonesia

in Indonesia, by creating and improving livelihoods for women in these rural areas.”

The project team has mapped the existing resources and technology needed to form a circular model, as well as requirements for further circular development opportunities on completion of the project, identifying sources for regenerative cotton and local textile waste streams.

“The *Circular Livelihoods* project aims to reduce the environmental impacts of cotton and textile waste, as well as provide positive economic and social impacts to local communities in Indonesia, by creating and improving livelihoods for women in these rural areas.”

Working with regenerative agriculture

Currently, the majority of cotton in Indonesia is grown on large scale monoculture farms. SukkhaCitta has been working with smaller scale smallholdings that employ more traditional, and sustainable, mixed-farming methods. *“The problem with monoculture farming is that it encourages pests, so you need more pesticides, and causes the soil to erode, so you need more fertiliser, creating greenhouse gases more potent than CO2. It’s not sustainable,”* says Bertram Flesch.

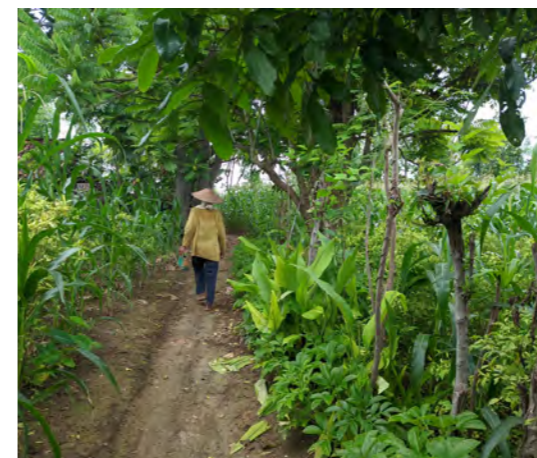


Fig. 4 Regenerative farm in Indonesia



Fig. 5 Cotton farmer Mbak Arum

“Traditional smaller scale methods are regenerative. Mixed crops and animals mean land can be fed with compost and manure, and there is less need for pesticides. It enables the soil to retain more water and, importantly, it can lock in more carbon. Land that is cultivated in a regenerative way can sequester 10 tons of CO2 per hectare compared with conventional cotton cultivation, which can create around 3 tons of CO2 per hectare. Growing a mixture of crops means farmers can also provide food for their community.”



Fig. 6 White harvested cotton



Fig. 7 Hand ginning of regenerative cotton



Fig. 8 Hand spinning of regenerative cotton

One of the biggest achievements for the **New Landscapes** project team was the sourcing of machinery to help process the fibres into yarn, including a ginning machine to separate seeds from cotton fibres, and a shredding machine to take textile waste back to fibres ready to be spun.

“The machines are small enough to be used in local communities rather than large factories, and can be made and adapted locally, so there is no reliance on expensive imports. This also creates new areas for employment around machinery fabrication and maintenance,” says Zoë Powell.

The machines will enable the regenerative cotton project to scale up. The aim is to boost cotton production to 5 tons next year (a 250% increase compared to 2021), and 10 tons the following year. By including several other farms, SukkhaCitta is currently preparing to grow more cotton regeneratively — ultimately providing better livelihoods for more than 100 farmers.

Empowering communities

The team has produced the first spinning prototypes and will continue to explore ratios of virgin and recycled cotton beyond the end of the project. Working with a local textiles school in Indonesia, they plan to test prototype yarns and fabrics. In future, they also aim to explore other waste streams, including agricultural waste, such as banana stems.

Through training and knowledge sharing with rural smallholders and weavers, they hope the skills will empower rural communities. *“Artisans working with SukkhaCitta see an average increase in income of around 60%. This increase in income can be the difference between a girl going to university or finishing education in primary school,”* says Bertram Flesch.



Fig. 9 Spun yarn developed using regenerative cotton and denim waste

*“The **New Landscapes** project is the foundation from which we can start to build demand for regenerative and recycled fabrics — benefitting the environment, building communities more resilient to climate change, and creating new, sustainable livelihoods in rural Indonesia.”*



Fig. 11 Weavers in Medono setting up and weaving on a loom

Key outcomes

1. Establishment of a circular supply chain by sourcing locally grown, regenerative cotton and waste textiles supply.
2. The sourcing and purchase of machinery to process cotton and textile waste, enabling scaling up of production.
3. Mapping existing processes and resources, as well as identifying those needed in the future, to build a circular model.
4. Promotion and widened reach of **Circular Livelihoods** with an exhibition in Jakarta, and exposure to 10,000 people with 20+ examples of local media coverage.
5. Development of a website: rumahsukkhacitta.org/circular-livelihoods
6. **TRL (Technology Readiness Level):** Start 1 — End 3.

Key themes

Sustainability
Materials
Manufacturing and commerce

Sustainable Development Goals (SDG) Contribution



Fig. 12 Batik artisans in East Java, Indonesia

*“The **New Landscapes** project is the foundation from which we can start to build demand for regenerative and recycled fabrics — benefitting the environment, building communities more resilient to climate change, and creating new, sustainable livelihoods in rural Indonesia.”*



Fig. 1 A bespoke tailor mending denim in Lagos, Nigeria

3.2 Denim to Denim – Supporting circular denim practices in Nigeria

Denim to Denim is a virtual platform which convenes marginalised voices in denim recycling – tailors, menders, and up-cyclers – to explore and foster circular solutions for future denim design and production practices.

- Jocelyn Whipple, Totnes, Devon, UK + Sola Idowu, Lagos, Nigeria
jocelynwhipple.co.uk
fashionrevolution.org/africa/nigeria/

What happens to a pair of jeans when they are no longer wanted by their original owner? An overproduction of denim, especially in the global north, has created a strong global market for second-hand denim. Some garments are passed on for domestic resale in charity and vintage stores, but many are exported around the world, often to developing countries, for recycling or repurposing.



Fig. 2 Imported-denim reseller with her collection in a Nigerian market

A highly skilled industry of secondary and even tertiary markets exists for denim. Its tailors, menders and other artisans play a key role in recycling textiles, but the informal nature of their work means they are often overlooked in more formal industry narratives for increasingly high-value circular practices.

Responsible-fashion consultant Jocelyn Whipple, based in Totnes, Devon, and Sola Idowu, country co-ordinator for fashion activism organisation Fashion Revolution Nigeria, aimed to address this inequality – and discover new insights – with the creation of a virtual platform to support circular design and production practices for denim.



Fig. 3 A group of recycled denim tailors in Lagos, Nigeria

“Conventional industry preconceptions, projections and positioning around circular textile economies are one directional, top down and narrow. We wanted to shift the narrative away from the exclusive arenas of big corporations and instead explore it through the lens of those who are implementing circular practices on the ground,” explains Jocelyn Whipple. *“This growing community of practitioners have skills and knowledge that are overcoming and addressing many of these issues but are not usually considered or consulted about design and material solutions.”*

“We wanted to shift the [circular textiles] narrative away from the exclusive arenas of big corporations and instead explore it through the lens of those who are implementing circular practices on the ground.”

Bringing together marginalised voices

The **New Landscapes** project — **Denim to Denim** — brought together diverse and marginalised voices from across the denim and related industries in the UK and Nigeria to support cross-cultural consultation and collaboration towards achieving more circular solutions in the design and production of denim. The project used on-the-ground and online communication methods to distribute questionnaires, host meetings and webinars, and facilitate dialogue. This enabled participants — including skilled practitioners in design, tailoring, construction and alterations, trade, marketing, academics and students — to share technical insights about design, production, utilisation, durability and life cycle, as well as experiences of working in the global denim value chain.

“The discussions raised several areas for further consideration. It was evident that many of the project participants had no knowledge of the chemicals in the denims they were working with and handling, due in part to dyeing and finishing processes, and how they may impact their health,” says Jocelyn Whipple. *“They also highlighted the issue of use of stretch denim, which is increasingly popular but presents problems for recycling, upcycling and longevity due to the mixed use of synthetic fibres with cotton, which is a plant fibre with different characteristics.”*

The ‘blending’ of synthetic fibres together with natural plant fibres has long caused problems across the textile recycling industry. To recycle the fibres, the different material sources (oil based and plant) must be separated — a process which is very difficult with current technology.

The project highlights the importance of designing from the outset the materials necessary for a garment’s life — taking into consideration longer-term objectives of recycling, upcycling and longevity. For example, Elastane, a synthetic that provides the ‘stretch’ in some denim, tends to lose its properties over time, leading to a poor fit, loss of quality and shorter lifespan. In addition, Elastane fibres are extremely difficult to process through machinery for recycling, often clogging up the machines.



Fig. 4 Upcycled denim wear and slippers

Recommendations for industry

One outcome from the **New Landscapes** Denim to Denim project research, resulted in a set of practical recommendations for the denim industry, surrounding physical durability (creating products that can resist damage and wear), as well as emotional durability (creating products that can stay relevant to the user or have multiple users and uses over time). These included:

- Incentivising reuse by removing VAT from upcycled goods.
- Legislating compulsory durability tests on denim garments.
- Designing for repair — for example, with side seams that are easy to re-open and re-tailor.
- Challenging ‘fashionable’ trends for ripped, chemical and water-intensive washed looks that limit the life of the fabric and use precious resources.
- More emphasis on care and repair communicated through primary retail, and easier access to repair services.
- Challenge stigmas around second hand, normalising visible mending and re-fashioning.

The **Denim to Denim** project was designed to be replicable in other countries, and the team hope it will grow with a digital forum for informal and marginalised practitioners to share their insights with each other and, importantly, the wider industry.

“Many of the participants in Nigeria did not see or understand the importance of their role in addressing the issues of environmental and social justice in the denim industry,” says Sola Idowu. “We have all gained significant insights from this collaboration; voices have been heard, people feel more empowered and even obligated to carry on as ambassadors of a circular approach to denim practice. Our hope is that it has also increased awareness in industry of the denim lifecycle and the role of these previously ignored experts in the denim value chain.”



Fig. 5 A tailor in a denim upcycling factory, implementing circular practices in textiles

“Many of the participants in Nigeria did not see or understand the importance of their role in addressing the issues of environmental and social justice in the denim industry.”

Key outcomes

1. A virtual platform was created that enabled diverse and marginalised voices from across the denim industries in the UK and Nigeria to collaborate on circular solutions for denim design and production.
2. A series of practical recommendations on improving the durability of denim garments were created, informing the wider fashion industry and contributing to global dialogue around circular denim.
3. Development of a blueprint approach toward workable methods, with the potential to train and facilitate the same process for other global regions.
4. Scoping potential links with UK sustainable denim practices and SMEs.

Key themes

Sustainability
Materials
Manufacturing and commerce

Sustainable Development Goals (SDG) Contribution





Fig. 1 A woven shirt in a factory in Bangladesh, Azim Group

3.3 Bureau 555 – Virtual fabric and garment sampling in Bangladesh

Virtual alternatives to fabric and garment sampling could potentially save time, carbon emissions and waste. Bureau 555 is exploring how refining digital imaging processes and developing training in 3D software skills can make virtual sampling more accessible to the apparel and textiles supply chain.

- Gabrielle Shiner-Hill, London, UK + Nusrat Mahmud, Dhaka, Bangladesh
bureau555.com
hfl.com.bd
shinerhilldesign.com

There is a lot of discussion around retail waste in ‘fast fashion’ but less on the processes involved before a garment even makes it to the High Street. Traditional models of product development rely on physical processes: the production of fabric, creation of garment samples, and sending these from country to country. This results in landfill waste from fabrics and apparel that never go into production, carbon emissions from mills and transport, and, not least, wasted time in generating sampling of new products.



Fig. 2 A collection of samples being examined in a fabric mill in Bangladesh

While virtual sampling – creating digital 2D and 3D fabric and garment representations – may potentially reduce this waste, the existing technology for digitising garments is impeded by complex digital imaging processes, the limited technical capability of users, and other aesthetic and technical issues.



Fig. 3 Assessment of heritage textiles for 3D digital representation

“In the ‘real world’ you start with the fabric, and there shouldn’t be a difference in the digital world,” says Gabrielle Shiner-Hill who, along with Nusrat Mahmud, led the **Bureau 555 project**, which aims to make digital technologies accessible throughout the fashion supply chain and, importantly, introduce accessible training methods for the skills required for this transition in Bangladesh, a global centre for fabric and garment production.”

“We explored the digital fabrics in the same detail and with the same considerations as we would real fabric.”

Gabrielle Shiner-Hill is Director at design and fabric-sourcing consultancy Shinerhilldesign, based in London, and Nusrat Mahmud is Director at Hamid Fabrics Ltd in Dhaka, a woven fabric manufacturer exporting to the USA and European markets. The project combined their expertise in 3D software and textiles. *“Virtual sampling software tends to have been developed with limited consultation with fashion and textile industry, so textile knowledge comes as an afterthought, which is where the digitisation of garments particularly falls down,”* says Nusrat Mahmud. *“We have looked at developing digital fabric representations with the same considerations and attention to detail as we would real physical fabrics.”*

Creating true-to-life digital fabric renders

The project team created true-to-life fabric renders by combining high quality scanning with the physical data characteristics collated from extensive testing of physical fabric samples. *“We built an in-house laboratory in Dhaka to carry out testing on the qualities of fabrics, such as drape, thickness and weight. We then applied that data to software to create a*

more realistic representation of the way a fabric moves and drapes,” explains Gabrielle Shiner-Hill.

Currently, much of the physical fabric produced is sent to other countries, such as China, so key to the project was establishing training of digital visualisation methods for staff in Bangladesh. The team recruited and trained six people – five in Bangladesh and one in the UK – in 3D rendering software. *“These are not currently skills that are broadly taught in universities, our team were a mix of textile graduates and graphic designers who were able to combine their expertise in learning this new technology,”* says Gabrielle Shiner-Hill.



Fig. 4 Fabric testing to determine weight and density of materials for digital representation



Fig. 5 Scanning of physical fabric samples for digital representation

A legacy of the **New Landscapes** project is the formation of a new business, Bureau 555¹⁵, which will build on the research. While continuing to refine the digital rendering of drape and textile thickness, and creating new garment objects in a 3D environment, a key aim is to start skilling workers in the ready-made garment industry, such as those on the sewing lines.

“The vast majority of workers in Bangladesh are women, who have key material knowledge and craft skills. Learning these digital skills will not only help make virtual sampling more accessible across the supply chain, but it importantly offers scope for professional development and advancement,” says Nusrat Mahmud.

Insights into perception

For virtual sampling to gain widespread acceptance, the processes need to be fully understood within the fashion and textiles industries. With the aid of a detailed survey, the project team gained insights into people’s perceptions of textiles represented in a digital environment. The team also engaged with textile mills and garment makers in Bangladesh to present fabric digitisation to wider industry participants, gain feedback on this digital R&D, and insights into further advancement of existing tools.

¹⁵ www.bureau555.com/about



Fig. 6 The © Bureau555 team in Bangladesh who were upskilled in the use of 3D rendering software



Fig. 7 3D rendered digital models of fabric swatch and garments, reducing the need for physical fabric sampling and toiles

“To date, we have digitised more than 200 fabrics for a range of international brands. The industry feedback on the digital assets created has been very positive” says Gabrielle Shiner-Hill.

But it's not just the textiles supply chain in Bangladesh that could gain from this research and development; there is scope for cultural beneficiaries, too. Alongside industry sampling, the team have also begun to develop a digital archive of heritage fabrics. Nusrat Mahmud explains: *“Bangladesh is home to so many beautiful fabrics, created with skills passed down through the generations — but the craftspeople are becoming fewer in number. By creating digital records of their work, we ensure this knowledge and expertise is secured for future generations to learn from, and experience.”*

“To date, we have digitised more than 200 fabrics for a range of international brands. The industry feedback on the digital assets created has been very positive.”

Key outcomes

1. Creation of a new specialist 3D fabric digitisation spin out company, Bureau 555.
2. Recruitment and training of six staff — five in Bangladesh and one in the UK — in 3D rendering software.
3. Development of digital assets of more than 200 fabrics for international brands.
4. Establishment of an in-house lab in Dhaka for the physical testing of fabric samples.
5. Engagement with 75 key industry individuals to highlight the potential of virtual sampling.
6. A survey of industry perceptions of textiles in a digital environment. 65 respondents: 70% from the UK, 20% from Bangladesh and 10% from the rest of the world.
7. Establishing links with BFTT SME R&D project with Dash & Miller, and a BFTT Report with the V&A on the Fashion Metaverse, as well as exhibiting at the V&A Digital Design Week.
8. **TRL (Technology Readiness Level):** Start 2 — End 6.

Key themes

Sustainability
Digital
Manufacturing and commerce

Sustainable Development Goals (SDG) Contribution





Fig.1 Sisal fibre harvesting in Kenya

3.4 The Sisal Project – Producing a sustainable, weavable textile from sisal fibre in Kenya

Sisal has the potential to provide both a sustainable commercial textile, as well as the opportunity to add value to smallholders and craftspeople. The Sisal Project in Kenya explored production of sisal yarns and fabrics, methods to increase their weavability – and how to engage fashion designers to use them.

- **Martyn Roberts, Ramsgate, UK + Iona McCreath, Nairobi, Kenya**
fashionscout.com
kikoromeo.com

Sisal grows easily in Kenya, requiring little water, adapting to the local environment and forming a key material in traditional weaving, such as baskets and bags. With a low environmental impact, its use in fashion and textiles has the potential to create a sustainable cloth, reducing the dependence on imported textiles, as well as providing value to the smallholder farmers and artisan spinners and weavers currently working with the crop. However, the stiff fibre can be difficult to weave into fabric and the result can be rough, scratchy and uncomfortable textiles.



Fig. 2 A group of local artisans weaving baskets using locally produced sisal fibre yarns

Working in consultation with designers, both in Kenya and globally, the **New Landscapes** project brought together the expertise of sustainable Kenyan fashion brand KikoRomeo and UK-based consultancy Fashion Scout, renowned for showcasing fashion innovation, to explore ways of producing sisal yarns for softer, more wearable woven cloth.



Fig. 3 The local wood bark used to dye the sisal fibres

Working with local and traditional skills

The team spoke with local communities and women's groups who grow or work with sisal in Kenya, to gain a better understanding of its qualities before experimenting with different techniques for processing and spinning.



Fig. 4 Dyeing of sisal fibre using natural dyes

“Our original plan was to use enzymes to soften the fibres, but there was a global shortage at the time, so instead we tapped into the vernacular knowledge and used the traditional skills of beating the fibres to soften them,” explains Iona McCreath, Creative Director of KikoRomeo. *“As well as being effective, the hand processing technique is more likely to generate a softer fibre.”*

Traditional methods were also found to be most effective when it came to spinning. *“One of the key challenges of the project was convincing the craftspeople to try working with sisal in new ways. We were fortunate that a very talented master weaver came on board and together we experimented with different ways of spinning the fibres,”* says Iona McCreath.



Fig. 5 Softening and extraction of sisal fibres from the plant by cutting and beating

The team created two successful yarns: a pure sisal yarn, and a 50/50 sisal and sustainable cotton yarn. The next stage will be to scale up production of the yarns to weave them into textiles for further experimentation. Through connection with the FTTI, the project has discovered potentially viable, mechanised methods of softening of sisal fibres using larger-scale but low-technology machinery, which may enable scaling up of production through a further phase of R&D.

Engaging the fashion industry

The project team, in collaboration with FTTI, plan to showcase the findings of the **New Landscapes** project through a peer review academic paper,

as well as a presentation at an industry event. *“The idea is that we will showcase the research to designers, from raw fibre to finished garments,”* says Martyn Roberts, Director of Fashion Scout. *“The design element is very important, so it’s vital we gain feedback on the cloth and its potential from designers.”*

Future engagement with designers in Kenya is also important. As Iona McCreath explains: *“Kenya relies on a lot of imported fabric. Our hope is that, at scale, sisal fabrics could enable Kenyan designers to dress Kenyans in a home-grown, low-cost, well designed, and sustainable alternative.”*

“The design element is very important, so it’s vital we gain feedback on the cloth and its potential from designers.”



Fig. 6 Spinning of sisal fibres into a weaving yarn



Fig. 7 A local weaving a cord using dyed sisal fibres in Kenya

“Sisal fabrics could enable Kenyan designers to dress Kenyans in a home-grown, low-cost, well designed, and sustainable alternative.”

Key outcomes

1. Production of two sisal yarns: a pure sisal yarn, and a 50/50 sustainable sisal and cotton mixed yarn.
2. Development of a method for achieving a sisal yarn with softer, more wear-able properties.
3. Establishing a greater understanding of the sisal supply chain in Kenya.
4. An academic paper, which will publish the project findings and underpin academic materials research.
5. A showcase for the research.
6. Potential links with a UK producer of plant-based cloth using traditional mechanical fibre beating and processing techniques.
7. **TRL (Technology Readiness Level):** Start 2 – End 3.

Key themes

Sustainability
Materials
Manufacturing and commerce

Sustainable Development Goals (SDG) Contribution





Fig. 1 Exploration of circular garment fastenings and accessories

3.5 Plan B – Exploring circular garment fastenings and accessories in Bangladesh

Zips, buttons, and poppers pose a barrier to recycling polyester clothing as some of them are made of metals. This project explored the potential to produce both recycled and recyclable fastenings in Bangladesh – helping to advance circular practices and reduce reliance on imported products.

- **Tim Cross, Plymouth, UK + Mahmudul Hoq, Dhaka, Bangladesh**
projectplanb.co.uk
yester.com.hk

While limiting the production of new polyester materials is desirable, existing polyester clothing has the potential to be a completely circular product, recycled for reuse multiple times. The fabric can be mechanically returned to recycled polyethylene terephthalate plastic (or rPET) – the material building blocks of polyester – and used to spin into new yarns.



Fig. 2 Detection of metal from the uniforms before the polyester is melted into pallets



Fig. 3 Approach to circular methods in polyester recycling

However, zips, poppers, and other trims and fastenings are often made from varied materials, which means they need to be removed from garments and separated into material types before processing – adding cost, time and manual effort. Developing a mono-material garment at the initial design stage would simplify recycling processes.

Project Plan B, a UK garment design and manufacturing company specialising in sustainable workwear, joined forces with zip manufacturer Yester, in Dhaka, in a project to explore the potential of manufacturing recyclable garment fastenings.

Bangladesh is one of the primary bases for low-cost manufacturing, particularly for fast fashion, but it is heavily reliant on imports for many of the component parts. “If we can engage Bangladesh with the circular economy, it could have a significant impact on the availability of recycled and recyclable clothing globally,” explains Tim Cross, CEO of Project Plan B.



Fig. 4 Metal detecting machine in Bangladesh



Fig. 5 Shredded polyester fabrics before melted into pellets



Fig. 6 Recycled Polyester pellets

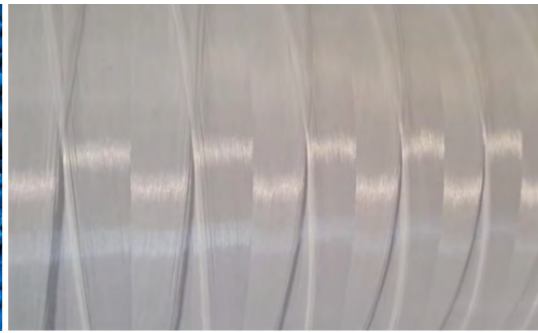


Fig. 7 Recycled polyester yarn

“A key part of the **New Landscapes** project was to see whether we could design a recyclable zip that could be produced in Bangladesh. This would enable a reduction on the reliance on imports, build on their garment manufacturing success, and enable Bangladesh to be leading in the sustainable, circular clothing production movement.”

“If we can engage Bangladesh with the circular economy, it could have a significant impact on the availability of recycled and recyclable clothing globally.”

Developing a recyclable zip

Zips pose a particular problem for recycling because although it is possible to make the ‘tape’ and the ‘teeth’ from mono-fibre polyester, the ‘sliders’ – which open and close the zip – tend to be metal. “Currently recycled polyester sliders are not strong enough and fail after 20-30 uses,” says Tim. So, the project was twofold: investigate the strengthening of recycled polyester polymers, while also exploring options of designing and producing sustainable components in Dhaka.

As part of the **New Landscapes** project, the FTTI explored the options for additive materials that could be incorporated with polyester to make it more robust, enabling the zip slider to withstand increased wear without compromising its ability to be recycled. The provisional R&D provided a number of material approaches, and there are plans to test these with injection-moulded prototypes.

“Accepting that the slider would have to be metal for now, the second part of the project set out to establish whether we could source and use polyester

components in our manufacturing processes,” says Mahmudul Hoq, director of Yester. “We were successful in finding these components and attaching them to clothing.”

With further research, the team planned to bring both elements of the project together and trial the production of recyclable components manufactured locally in Dhaka. Covid-19 put a halt to on-the-ground networking within Bangladesh, however, the team hope to engage local manufacturers with the research, highlighting the potential benefits of increased circularity to their businesses.

Opportunities in the circular economy

“This **New Landscapes** project is in its early stages but shows there is an opportunity for Bangladesh. Manufacturing our own sustainable components cuts out the middleman and makes Bangladesh less reliant on imports, predominantly from China. Demand for circular clothing is growing. It shows our customers – and the wider industry – that what we can produce is relevant,” says Mahmudul Hoq.

“Manufacturing our own sustainable components cuts out the middleman and makes Bangladesh less reliant on imports.”

Tim Cross agrees: “As we head towards a circular economy, it’s vital we don’t leave behind large-scale manufacturing countries, such as Bangladesh. We need to ensure they have the tools and skills to design and create clothing that is recycled and recyclable – putting this region in the vanguard of addressing the sustainability challenges we are facing globally.”



Fig. 8 The injection moulding of additives and polyester to make garment fastenings in a Bangladeshi factory

Key outcomes

1. Identification of ways to strengthen polyester polymers and method of trialing samples.
2. Development of new zip designs for circular clothing.
3. Sourcing recyclable components for zips at Yester, Dhaka, and successfully incorporating them into clothing.
4. Determining academic links spanning design and materials engineering, which will help to support the R&D longer term.
5. **TRL (Technology Readiness Level):** Start 1 — End 3.

Key themes

Sustainability
Advanced materials
Manufacturing and commerce

Sustainable Development Goals (SDG) Contribution



4 Analysis



Imported denim in a market in Nigeria

The design of the **New Landscapes pilot R&D programme** optimised all available provision in support of each of the SME project teams and their objectives as outlined. Future opportunities were also identified for development beyond the timeline of this initiative.

Enablers	Opportunities
Each of the five project teams received a cash grant of £6,000 from the British Council to support research and development project costs.	The New Landscapes pilot R&D programme has provided an evidence base for each of the SME partnership projects to undertake further R&D.
In addition, each of the project teams received a range of bespoke support and expertise from the FTTI including: specialist academic advice and input from an R&D Professor; technical guidance, research project planning and management from an FTTI R&D Fellow (an early career researcher, ECR). Additional expertise included business advice as appropriate.	The programme fostered collaboration between ODA and UK countries. It illustrates the benefit of specialist academic provision and an ecosystem of transdisciplinary support in helping solve complex challenges across fashion, textiles and technology sectors.
The FTTI facilitated a number of online networking events between the project teams, enabling peer-to-peer learning, knowledge exchange, expansion of each project's network and international reach.	The programme has generated new knowledge and knowledge exchange. Knowledge and expertise from each of the projects has been shared across different cultures of international practice, the project participants and their extensive communities.
Each of the original BFTT SME R&D awardees (35) were invited to attend networking, knowledge exchange, research, and development events. This cohort were also invited to an event that outlined the project findings, and are linked into FTTI and British Council networks and activity.	Each project has achieved an advance in TRLs ²¹ and a strong foundation for further investment and R&D.
The British Council network of in-country ODA offices enabled wider access to international development networks and expertise.	The programme has enabled a series of different working R&D partnerships, plus an initial evidence base for R&D across each of the five projects, which may now be used to attract further support and investment.
The FTTI enabled peer learning with UK SMEs which have benefitted from the UKRI Business of Fashion, Textiles and Technology funding award ¹⁶ .	The programme provides a methodology to advance the case for more sustainable approaches toward Fashion, Textiles and Technology R&D, and provision to support this activity at international level.
The FTTI enabled the New Landscapes R&D project teams to gain direct access to specialist academic links and networks, which would otherwise not have been achievable in the timeframe. The combined UAL, FTTI and British Council network of social and communication platforms significantly increased visibility of the projects and project teams. UAL's online news story ¹⁷ announcing the funding recipients had nearly 1000 unique page views in a six-month period. Engagement was primarily driven through UAL social media and stakeholder newsletters and webpages, including the Creative Industries Clusters Programme Newsletter ¹⁸ and UAL's Instagram ¹⁹ and LinkedIn ²⁰ channel, which has a significant global following.	

The scheme's delivery methodology considered ways to help navigate some of the challenges that an international programme of this type may present, including Covid-19. Key findings (**Enablers; Opportunities and Challenges; Benefits**) from this pilot initiative are outlined as follows:

Challenges	Benefits
The level of grant funding was limited and the programme timeframe was short (four months). The ambition of each of the project teams and the potential of each project was greater than the resource available.	Throughout the course of the programme, the FTTI facilitated events connecting the BFTT SME cohort with the New Landscapes SME cohort ²² . SMEs across the two cohorts found synergies, which may generate new collaborations between businesses.
Resourcing projects was challenging in some ODA countries, with shortages of materials, fuel, manufacturing equipment and facilities, textile testing equipment and laboratory facilities that tend to be more readily available in the UK. Therefore, some projects had to adapt their course. However, these projects benefitted from FTTI academic support to help explore alternative approaches towards R&D.	Many of the New Landscapes SMEs participated in additional public-facing events, as well as the production of online content throughout the duration of the programme. In each of these instances, the FTTI, UAL, and the British Council promoted events and content on social platforms to gain a wider reach ²³⁻²⁶ .
Project meetings predominantly took place via digital means. Although this offered greater flexibility for engagement across the programme delivery, limited internet provision in some ODA countries proved a challenge, on occasion limiting the ability of some participants in contributing more consistently to project development.	New Landscapes' SMEs were able to share progress on their findings and R&D strategies throughout the duration of the programme. Knowledge exchange was supported by the FTTI to enable peer-to-peer learning.
Covid-19 posed challenges to some of the projects with an impact on individual participants due to illness, and travel, which posed difficulties in progressing certain aspects of the R&D within the ODA countries.	The academic Project Lead aligned to each of the five projects supported project planning and management, as well as providing technical guidance and research assistance throughout the project duration. The Project Lead also facilitated the knowledge exchange between academic mentors and the companies.
Shipping restrictions due to Brexit and other global factors imposed some delays in the transit of materials required for some of the projects.	By supporting R&D, the FTTI enabled each of the SME project teams to realise a concept that, on completion, reached a new TRL. This offers the SMEs involved the potential to apply for further funding and/or investment. To accelerate this process, the FTTI has advised on further funding opportunities where relevant and will continue to help guide and support companies as appropriate.
Political and environmental challenges (e.g. local flooding) within some ODA countries limited the progress of certain projects in the timeframe.	Convening the SME projects and projects groups via the FTTI and British Council programme mechanisms lays a foundation for future partnership and collaboration opportunities.

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5 Conclusions & Recommendations



Cotton farmer Ibi Kasmini on her farm with the Sukka Chitta team

Conclusions & Recommendations

From climate change to Covid-19, the challenges currently facing the global fashion, apparel and textiles industries increasingly demand a cross-disciplinary skills approach. The **New Landscapes pilot R&D programme** was developed to take a holistic approach to sustainability across FTT sectors, with a collective focus on environmental, social and economic impact.

The programme placed materials innovation at the foundation of creating more circular production and consumption practices. Crucially, it enabled a wider community of collaborative SME business practices based across UK and ODA countries to access the very latest in sustainable and circular research and development.

This combination of expertise from industry and academia helped rethink alternative manufacturing processes. The programme acknowledged that while digital technology should be more accessible, and inclusive in its development and training, it may also benefit from operating alongside valuable tacit analogue knowledge and experience.

In just four months, the programme tested six novel technologies and developed four different product prototypes. The SME project teams created six permanent jobs within ODA countries and improved the livelihoods of 72 farmers. Three new cross-disciplinary links for the SME project teams were facilitated, and 116 industry advisors were consulted. The R&D project teams conducted two surveys, participated in 12 presentations, workshops and events, and two associated reports have been published.

The **New Landscapes pilot R&D programme** also aligns with the UK Government's wider strategic goals in terms of international development. The Government's International Development Strategy²⁹ is based around four key principles including "supporting the long-term agency of countries and people, building effective institutions and capabilities, and drawing on UK world class research and expertise." It considers that "success means unleashing the potential of people in low and middle-income countries to improve their lives. When people have more power and choice, populations become more prosperous, peaceful, and healthier."

It is considered this approach will enable provision for effective, integrated support to partner countries striving to determine their own future. And goes on to propose support to partner countries by exchanging good practice, and building partnerships across government, business, and civil society. These aspirations, alongside the increasing imperative of addressing climate change, demonstrate the timeliness and relevance of the **New Landscapes pilot R&D programme**.

²⁹ [gov.uk/government/publications/uk-governments-strategy-for-international-development/the-uk-governments-strategy-for-international-development](https://www.gov.uk/government/publications/uk-governments-strategy-for-international-development/the-uk-governments-strategy-for-international-development)

Conclusions & Recommendations

Recommendations at programme level

- Build on the success and impact achieved in a limited period of time and consider if there is scope to extend the initiative.
- Engage at policy level with relevant government bodies and UK Research and Innovation (UKRI) to advance the importance and benefits of such programmes.

Recommendations at project level

- Facilitate cross-disciplinary links for the SME project teams, raising awareness of R&D opportunities in ODA countries with sustainability objectives.
- Provision for SME project teams to optimise initial sustainable R&D activity with the aim of scaling up.
- Support SME project teams to collaborate with other organisations and undertake new R&D.
- Improve access to skills training enabling ODA countries to become more involved in the development and application of innovative technologies that affect livelihoods.
- Further develop partnerships through networking, events and community building.

Colophon

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Responding to global drivers, the New Landscapes R&D programme stimulates international collaboration to re-evaluate the industry's relationship with climate change, the environment, and the need for radical transparency and social responsibility.