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Partner Country Case Study: Turkey

Final Evaluation of The Newton Fund

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TETRA TECH
International Development

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Disclaimer

The views expressed in this report are those of the evaluators. They do not represent those of the Department for Business, Energy and Industrial Strategy, the Newton Fund or of any of the individuals and organisations referred to in the report.

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Abbreviations

AH	Award Holder
AHRC	Arts and Humanities Research Council
AI	Artificial Intelligence
AKP	Justice and Development Party
ATM	Automated Teller Machine
BBSRC	Biotechnology and Biological Sciences Research Council
BEIS	Department for Business, Energy and Industrial Strategy
CBI	Cash-Based Initiatives
CIS	Community Innovation Survey
COST	European Cooperation in the field of Scientific and Technical Research
CSSP	Climate Science for Service Partnership
DAC	Development Assistance Committee
DARA	Development in Africa with Radio Astronomy
DBT	Department for Biotechnology
DP	Delivery Partner
DSS	Decision Support System
EMBC	European Molecular Biology Conference
EMBO	European Molecular Biology Organisation
EPSRC	Engineering and Physical Sciences Research Council
ESRC	Economic and Social Research Council
EU	European Union
GBP	British Pound
GCRF	Global Challenges Research Fund
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on Research and Development
GIS	Geographic Information System

GNI	Gross National Income
H2020	Horizon 2020
HSSE	Health, Safety, Security and Environment
IAPP	Industry-Academia Partnerships Programme
ICT	Information and Communications Technology
IOM	International Organization for Migration
INEW	Indo-UK Centre for Improvement of Nitrogen use Efficiency in Wheat
INGO	International Non-Governmental Organisation
INLOGOV	Institute of Local Government Studies
IPA	Interpretative Phenomenological Analysis
LIFE	L'Instrument Financier pour l'Environnement
LQ	Location Quotient
M&E	Monitoring and Evaluation
MEL	Monitoring, Evaluation and Learning
MLG	Multi-Level Governance
MoSIT	Ministry of Industry and Technology
MRC	Medical Research Council
MSK	Musculoskeletal
MTE	Mid-Term Evaluation
NERC	Natural Environment Research Council
NF	Newton Fund
NGO	Non-Governmental Organisation
NKCF	Newton-Katip Celebi Fund
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PI	Principal Investigator
QMUL	Queen Mary University of London
R&D	Research and Development

R&I	Research and Innovation
RCUK	Research Council United Kingdom
SDG	Sustainable Development Goal
SIN	Science and Innovation Network
SME	Small and Medium-Sized Enterprises
STI	Science, Technology and Innovation
STFC	Science and Technology Facilities Council
TARAL	Turkish Research Area
TOC	Theory of Change
TRC	Turkish Red Crescent
TÜBITAK	The Scientific and Technological Research Council of Turkey
TÜBITAK UME	TÜBITAK National Metrology Institute
UBTYS	Ulusal Bilim, Teknoloji ve Yenilik Stratejisi
UK	United Kingdom
UKRI	United Kingdom Research and Innovation
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
US	United States
USD	United States Dollar
VfM	Value for Money
WCSSP	Weather and Climate Science for Service Partnership
WEF	World Economic Forum
WFP	World Food Programme

Executive Summary

Newton-Katip Çelebi Fund in Turkey at a glance

- The Fund aims to create the opportunity to build strong partnerships between UK and Turkish scientists, researchers and institutions.
- From 2015 until 2021, the UK and Turkey each committed to allocate up to £4 million per year for the duration of the Fund - £56 million in total.
- Implementing organisations in the UK agree individual cooperation programmes with their Turkish counterpart, under the Newton Katip-Celebi Fund framework.
- Areas of focus include lifelong health and welfare, agriculture and food security, disaster and risk management, energy and climate change, and Social Sciences and Humanities.
- Implementers are British Academy, Royal Academy of Engineering, Royal Society, British Council, Innovate UK, Research Councils UK and The Scientific and Technological Research Council of Turkey (TUBITAK).
- Calls for funding include fellowships for mobility between Turkey and the UK, plus research cooperation between universities and research institutions.

The case study

Tetra Tech International Development produced this Turkey Partner Country Case Study to inform the Final Evaluation Report of the Newton Fund.[1] It is one of 11 country case studies that investigates the Fund's implementation and its results. It serves as a deep dive into the development, relevance, additionality, and results of (a) the programme activities; and (b) their success factors and barriers that affected their implementation.

The case study sampled three calls under the Newton-Katip Celebi Fund, from each a project was selected for in-depth analysis:

- **Interdisciplinary Research Links for Medical Artificial Intelligence (AI): Management of Musculoskeletal Injury** sought to apply an artificial intelligence, AI-based decision support tool for the treatment of musculoskeletal (MSK) conditions to reduce the burden on healthcare practitioners, particularly in remote areas. It set up institutional links between Hacettepe University and Queen Mary University of London. It tested the development of AI/eHealth solutions in Turkey as a way of determining whether the AI's 'intelligence' is fully generalisable or contains unintended features specific to the UK.
- **Syrian Refugees in Turkey: Understanding Local Government Responses** aimed to build research capacity in Turkey and further the Turkish Award Holder and her research team's methodological skills and career development. It set up links between the partner institutions which led to further collaborative research. When this project was designed, Turkey hosted the highest number of Syrian refugees in the world. The research project

[1] In this report, 'the Newton-Katip Celebi Fund refers to the joint UK-Turkey initiative through which funding calls were issued. 'The Newton Fund' refers to the broader UK programme financing activities in 17 countries, including Turkey.

analysed policies toward refugees implemented by local governments. The investigation adds to the discourse on viable policy approaches to the refugee crisis.

- **Innovating the Turkish Supply Chain for Services in Humanitarian Aid** focused on identifying ways to improve the logistics of humanitarian operations for Syrian refugees in Turkey. Nottingham Trent University and Koç University collaborated to improve the provision of education and healthcare services and a voucher system for relief items used by refugees. Using computer models and tools from the operational research field, the project focused on optimising planning and logistics of service delivery to refugees.

The research was carried out by reviewing documents at project- and fund-level and carrying out interviews. Between September and October 2020, the team interviewed 16 respondents on both the UK and Turkish side of each partnership, including Delivery Partners (DPs) in both countries, Award Holders (AHs) and UK Embassy staff, as well as high-level stakeholders from partner organisations in Turkey that were not sampled as part of the three projects. All the country case studies involved wide-ranging consultations and included as many diverse interview respondents as possible within the short timeframe of our fieldwork activities.

The case study is a self-contained investigation and its findings are not intended to be generalised to the entire Newton Fund in country. Case studies were limited to three projects per case study, which were conducted remotely owing to the Covid pandemic. In some projects, the added logistical challenge of remote research limited the number and range of stakeholders consulted. The case study findings reflect the data provided by each project and available information online. The volume of documentation provided varied by project, thus limiting the possibility of triangulating findings. In terms of total Newton Fund expenditure, the projects selected represent a very small fraction of all expenditure across 5,400 projects. The case study is therefore not representative of all Newton Fund activities. Whereas it provides valuable depth and illustration of Newton Fund activities, the case study alone does not provide generalisable evidence.

Key Findings

Effectiveness

- **The work of the Newton-Katip Çelebi Fund in Turkey has prepared the groundwork for further R&I collaboration and partnership-building.** The Fund has proven to be particularly suited to capacity building, establishing new institutional collaborations and formalising pre-existing links between researchers, as well as utilising the respective research excellence of both countries.

- **The Fund has also had a positive effect on research administration in Turkey**. Turkish Delivery Partners have developed protocols for working with UK research partners and have been increasingly applying these to potential research collaborations with other countries.

- **The Newton-Katip Çelebi Fund is 'additional' in terms of delivering results that would otherwise not have happened, particularly around its focus on localised, sub-national issues within Turkey.** Researchers had previously worked on similar initiatives (optimisation problems, AI application to decision-making, and local policy responses to refugees from Syria). Newton's added value was to foster collaborations with experienced UK academics and enhance the quality of the research generated. Overall, Turkish

research excellence is recognised among UK academics, and the Fund is seen as providing mutual benefits for both countries' Research and Innovation (R&I) sectors.

- **Through the work of the Newton-Katip Çelebi Fund in Turkey, award holders have been applying UK best practice and drawing on UK outputs to carry out additional research in Turkey.** The UK benefitted as a partner of choice in R&I collaborations with Turkey. There is strong evidence of the mainstreaming of UK good practice and relevance of the Fund to the broader objectives of UK science diplomacy in Turkey.

- **There is evidence of progress towards interim outcomes in the Theory of Change.** Partners on both sides highlighted the ease of the application process and flexibility of projects as key differentiators of the Newton Fund. All reported that they were able to investigate various research strains and change some project parameters in line with emerging findings.

Emerging signs of impact

- **The equitable partnerships outcome was achieved through the fostering of ecosystems that incentivise innovation and policy application.** All three projects sampled for this case study established institutional partnerships and solidified people-to-people relations, building research networks in areas as diverse as Turkey's refugee response and computer modelling for novel medical treatment.

- **Projects demonstrated the potential for policy application.** In practice, the direct translation of research to policy may be challenging because of the historically low collaboration between academia and government in Turkey. There has been some interest from international non-governmental organisations (INGOs) and local governments in the proposed policies or technical solutions. Further investment and research collaborations would be needed to translate findings into applied solutions.

- **Each project sampled adopted innovative technology and research methods or was approaching pressing social problems in new ways**. Where research insights and innovations are applied more broadly, they could contribute to both impact indicators in the Newton Fund Theory of Change: i) informed research and innovation contributing to progress towards equitable growth and welfare in Turkey and ii) contribution to economic development and welfare to support poverty alleviation. In practice, **this would require continued engagement with Turkey through the Newton Fund or a similar initiative**, in order to observe signs of impact.

Sustainability

- **The sustainability of work carried out through the Newton Fund has been affected by the COVID-19 pandemic**. There are indications that domestic sources of funding in Turkey might be reduced because of the impact of the pandemic on the national budget. Although the Fund has helped strengthen collaboration between the UK and Turkey, case study research indicates that **further effort is needed to deepen people-to-people relations and sustain these collaborations.** There is strong interest among the Turkish academic sector in further or similar research to the kind undertaken under the Newton Fund.

Complementarity and Coordination

- **The Newton-Katip Çelebi Fund had a positive effect on Turkish implementing partners' working practices, encouraging them to establish new protocols for bilateral research.** The Fund has also encouraged Turkish research administrators to explore ways of modifying national legislation to enable international science collaborations.

This was an unexpected outcome of the programme. Based on their positive experience of the Newton Fund, Turkish partners are encouraging other countries interested in bilateral collaborations to consider match funding as a research funding model.

Lessons Learned

- The main lesson learned from the Newton-Katip Çelebi Fund experience in Turkey is that **science, research, and innovation activities are resilient to unexpected economic and political changes.** The economic dip of 2018 and the general perception of a challenging political situation have not shaken Turkey's solid foundation of research excellence over the past five years. Based on the evidence gathered for this case study, UK researcher interest in collaborating with Turkey during the 2016 to 2018 period was maintained, despite fears of lack of academic freedom.

- For partner countries like Turkey, with which the UK does not have strong historical ties, **more attention could be given to understanding the local research management system.** This would include procedures for timely disbursement of funds, reducing risks around exchange rate fluctuations, and the speeding up of project initiation processes. Providing more support in these areas could have facilitated logistical and management processes.

- The Newton-Katip Çelebi Fund represented the first collaboration with the UK in bilateral research for many stakeholders in the Turkish research landscape. It took time to develop procedures and legislation changes necessary for project partnerships to take place. **More guidance from UK Delivery Partners to researchers and their host institutions** could have alleviated these teething problems.

Considerations and recommendations for the Newton-Katip Celebi Fund

- The most popular funding mechanism for Turkish researchers is Horizon 2020, which has a higher funding bracket than the Newton Fund. **The Newton Fund itself cannot compete with the funding provided by Horizon 2020, but a joint UK offering – for example including the Newton Fund and GCRF – could be positioned as a more viable alternative.** This could encourage more researchers to apply to the joint UK offering and further position the UK as a partner of choice in science collaborations.

- In its branding, the Newton-Katip Çelebi Fund could communicate Turkish research excellence in, for example, medical sciences and manufacturing industries. UK researchers' experiences for this case study point to a strong research culture in Turkey. However, at least as far as the sampled projects are concerned, projects were designed so that the knowledge transfer was primarily from the UK to Turkey. The UK research community has much to benefit from experimental and cross-disciplinary research carried out in Turkey. **Highlighting Turkish expertise could generate more interest from UK researchers and a more balanced exchange of knowledge and expertise.**

- Given the stated historically low collaboration between Turkish academia and government the Newton-Katip Çelebi Fund should **consider improving plans to achieve impact**, by collaborating on projects that have greater potential for translation.

- Research calls could be designed to take research findings closer to real-life situations. This could include bringing prototypes, models and findings to market, or at least disseminating them more widely to elicit interest among decision-makers. For instance**, each call and proposal could be evaluated against an additional criterion on potential**

research uptake. This would help ensure the translation of innovative science into products, policies, and services that can bring about socio-economic impact in Turkey.

1 Introduction

1.1 Aim and purpose of the case study

This report presents our findings for our Country Case Study of Newton Fund activities in Turkey, focusing on three activities in the country. Our findings are informed by an in-depth review of documentation and interviews with Turkey and United Kingdom (UK) stakeholders, as explained in more detail in Annex 1. Findings from this and the other ten country studies will help inform our Final Evaluation report. Remote research on the Newton Fund in Turkey was carried out in **September – October 2020**.

The purpose of the case study is to examine:

- the relevance of the country-level work to Newton Fund's theory of change, including the ways in which funded projects have supported the Newton Fund to achieve its stated outputs and outcomes.
- the effects of Newton funding in terms of the scale and type of results delivered by the sampled projects, and their potential impact on the socio-economic challenges identified in the country and more widely.
- the likely sustainability of the activities and results of the sampled projects and by the Newton Fund.

We also aim to better understand the overarching significance and impact of the Newton-Katip Çelebi Fund in Turkey, such as on the internationalisation of research institutions, the relationship between the partner country and the UK, and in the sharing of best practice between the two countries.

1.2 Research scope

This country case study focussed on the activities under the Newton-Katip Çelebi Fund. Specifically, it assessed the following:

- the **development of each activity** – examining its origins, how engagement with the Newton Fund occurred, and an overview of the process of securing Newton funding.
- the **relevance of each activity** to Turkey' development needs and to Newton Fund and Official Development Assistance (ODA) goals.
- the **additionality of each activity.**[2]
- the **results of each activity** in terms of the outputs, outcomes and impacts generated to strengthen the science and knowledge base, innovation capacity and policy influence in Turkey and beyond.
- the **success factors (and barriers) which affected each activity**, as well as the potential benefits from each activity that might be expected to arise in the future.

[2] In the context of the Newton Fund, additionality aims to assess whether a given call or project could have happened in the absence of the Newton Fund (for example, through funding for similar activities provided by other programmes).

The case study included a mix of ongoing and completed activities. When assessing these activities' results, we considered their ambitions as well as early signs of achieving impacts recognising that impacts of research and innovation take time.

To understand how sustainable solutions to economic development and poverty reduction have emerged from Newton Fund activities, our enquiry focussed on the factors that facilitate specific research activities, increase the quality of research outputs, enhance international collaboration for higher-level education and translate research into innovative practices.

The country case studies involved wide-ranging in-country consultations. For Turkey, we consulted 16 respondents, including Delivery Partners in both countries, Award Holders (AHs) and UK Embassy staff. This was combined with consultations with UK-based partners and researchers involved in the actions included in the study.

This country case study explores:

- the **development of each activity** – examining its origins, how engagement with the Newton Fund occurred, and an overview of the process of securing Newton funding
- the **relevance of each activity** to Turkey's development needs and to Newton Fund and Official Development Assistance (ODA) goals.
- the **additionality of each activity.**[3]
- the **results of each activity** in terms of the outputs, outcomes and impacts generated to strengthen the science and knowledge base, innovation capacity and influencing policy in Turkey and beyond.
- the **success factors (and barriers) which affected each activity**, as well as the potential benefits from each activity that might be expected to arise in the future.

We took into account that some of the activities included in this study are still ongoing and that the impact of research and innovation (R&I) interventions can often take years or even longer to unfold. Our research approach was adapted to reflect this, and we included signs of impact or intentions to achieve impact as indications of potential future impact.

1.3 Case study selection

As part of our sampling methodology for the Newton Fund country case studies, we shortlisted case study calls for each country based on three measures: size, pillar, and sector (see Annex 2 for details). Project selection considered thematic areas of focus, aiming to include priority areas for the Newton Fund in each country. We also sought to achieve a spread of Delivery Partners (DPs) and activity types across the countries in our sample. Following consultations with in-country teams (ICTs), DPs and the Newton Fund Central Team, we selected **three calls per country**. This selection allowed us to include a call under each of the Newton Fund's core activity pillars: People, Research, and Translation.

The next step to the case study selection is the sampling of one specific project from each of these three calls to ensure as broad geographical and partner coverage within the country case study's short timeframe. We also considered the relevance of their specific research areas to the Newton Fund's priorities in Turkey when the projects were selected.

[3] In the context of the Newton Fund, additionality aims to assess whether a given call or project could have happened in the absence of the Newton Fund (for example, through funding for similar activities provided by other programmes).

The sampled calls and projects analysed in depth in this report are:

Calls	Projects
Institutional Links 6	Interdisciplinary Research Links for Medical AI: Management of Musculoskeletal Injury
Newton Advanced Fellowships (Year 5, Round 1)	Syrian Refugees in Turkey: Understanding Local Government Responses
RCUK-TUBITAK Research Partnership Call	Innovating the Turkish supply chain for services in humanitarian aid

1.4 Methodology

The research for the country case studies included desk-based review documentation and remote key informant interviews (see Annex 1). For the Turkey case study, we consulted 16 UK and Turkey stakeholders such as Delivery Partners in both countries, Award Holders (AHs), senior staff from partner organisations as well as the programme team and UK Embassy staff.

Due to COVID-19-related travel restrictions, we had to switch to a purely remote approach. We assured the quality of our interviews by building rapport with stakeholders by email prior to the interviews, reviewing documents thoroughly to identify the most important gaps to keep the sessions brief amongst other steps. Details of the limitations of this approach and our mitigation actions are set out further in Annex 1.

1.5 Strength of evidence assessment

Tetra Tech used a traffic light system to assess the case study's strength of evidence '(see figure 1 below).[4] The rating assesses the evidence supporting the conclusions reached given the methodological limitations outlined in Annex 1. Table 1 details the main sources of evidence used for this case study and the rating assigned to it.

[4] Our aim was to achieve a sufficient degree of confidence about the extent to which outcomes have occurred, Newton Fund's level of contribution to the outcomes and our theory about how the Newton Fund has contributed or failed to contribute. Confidence is affected by the extent of triangulation across sources and the position, knowledge, analytical capacity, and potential biases of primary informants. The ratings are not designed to be a rigid framework, but rather a way to ensure evaluative judgements were made systematically across the Evaluation Questions.

Figure 1: Strength of evidence ratings

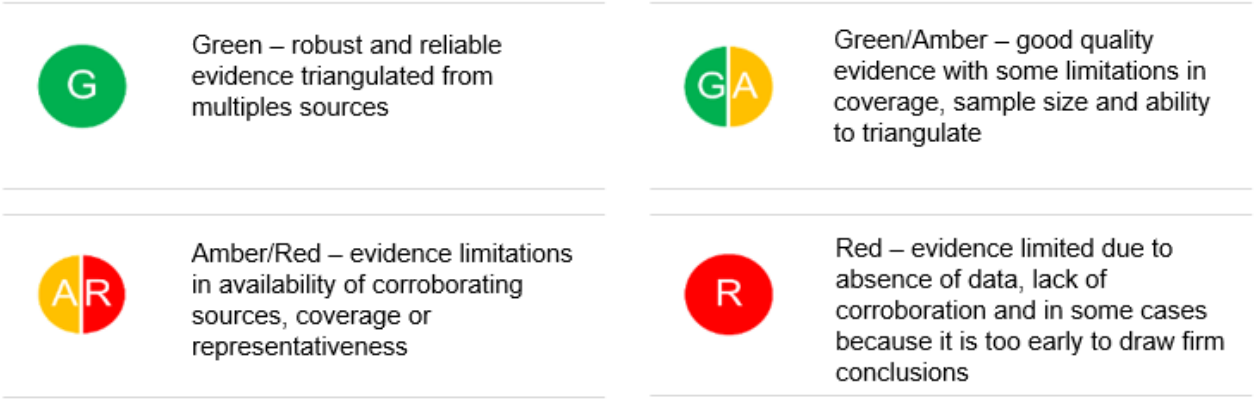


Table 1: Strength of Evidence for the Newton-Katip Çelebi Fund case study

Strength of Evidence	
Green/ Amber GA	There are gaps in the evidence, which limited the assessment of relevance, effectiveness, emerging signs of impact and sustainability. This is due to the relatively small sample of interviews conducted which limits the extent to which it is possible to assess if the Newton-Katip Çelebi Fund has produced results and benefited its intended recipients. In addition, the extent, type and structure of monitoring data and documentation varied across DPs, limiting the extent to which outputs and outcomes can be reviewed and triangulated.

1.6 Report structure

The report is structured as follows:

- **Section 2** introduces the context of Turkey, including political and economic developments and trends in the R&I landscape.
- **Section 3** discusses high-level emerging results of the Newton Fund in Turkey based on findings from the three sampled projects and broader consultations undertaken with the programme team.
- **Sections 4 to 6** analyse three specific projects more in-depth, providing an assessment of the relevance, effectiveness, emerging impact, and sustainability of the sampled activities.

2 Context

2.1 Political and Economic Context

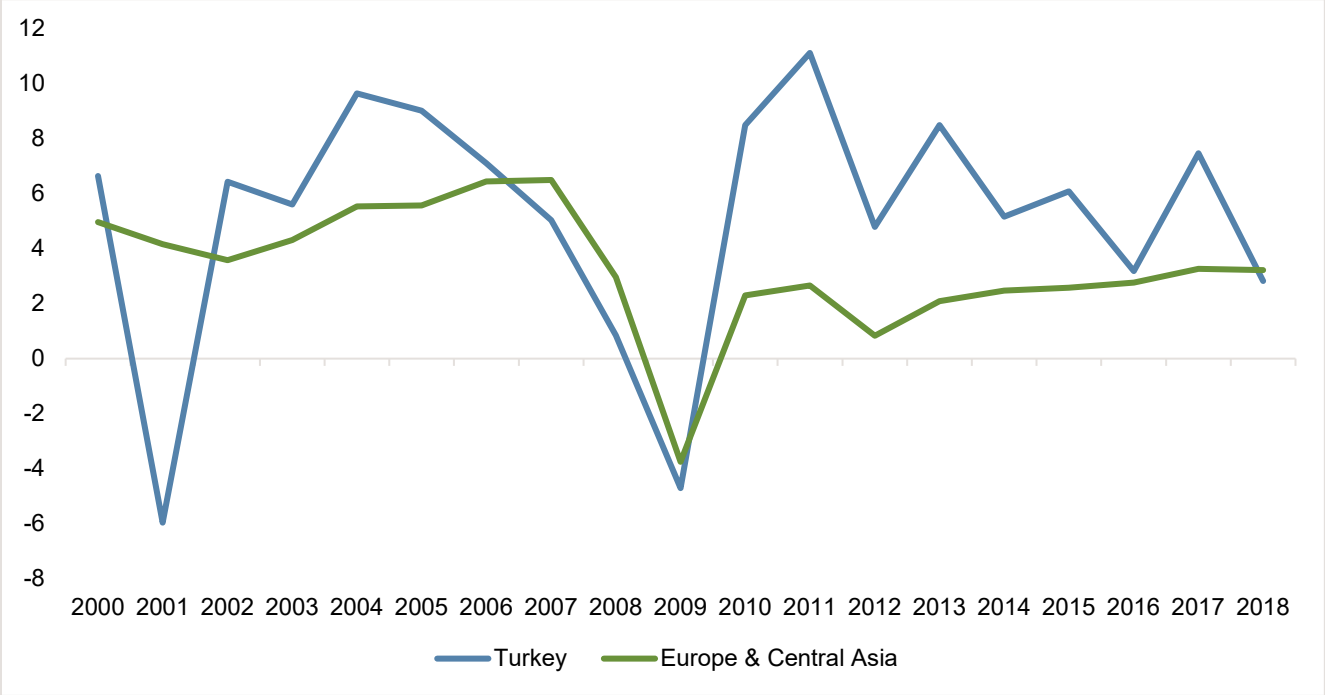
According to its constitution, Turkey is a Presidential Republic. The President of Turkey is both the head of state and head of government. The current president is Recep Tayyip Erdoğan, who previously served as prime minister from 2003 to 2014. He was elected president in 2014. In 2018, the system of government changed, abolishing the role of prime minister and establishing a new role of vice president. The latest elections in Turkey were the March 2019 local elections. Erdoğan's ruling party, the Justice and Development Party (AKP), in alliance with a right-wing party, lost in major cities, including Istanbul, but won 51% of votes nationwide. In the latest parliamentary election, the AKP lost its majority but is now ruling in coalition with the right-wing Nationalist Action Party.[5]

Turkey is included in the Development Assistance Committee (DAC) list of ODA recipients as an upper-middle-income country.[6] It was close to the upper threshold of this status in 2013 and 2014. However, since then, gross national income (GNI) per capita has decreased from $12,560 in 2014 to $10,420 in 2018[7], making graduation within the next five years unlikely. EU institutions provide the majority of ODA for Turkey. The UK is Turkey's third-largest bilateral donor after Germany and France. Despite being an ODA recipient, Turkey itself is an ODA donor country, primarily of humanitarian aid for Syria.[8]

Turkey faced economic difficulties in 2018, starting with a currency crisis in August. Gross domestic product (GDP) growth slowed sharply, from 7.5% in 2017 to just 2.8% in 2018.[9] This can be attributed in part to elevated inflation, pressures on real incomes, rising unemployment, and dampened consumption.[10] The year-to-year inflation rate reached over 16.3% in 2018, then decreased slightly to 15.3% in 2019.[11]

[5] LSE (2018) 'Turkey's missing swing voters: Understanding the results of the 2018 Turkish elections' Available at: http://blogs.lse.ac.uk/europpblog/2018/07/13/turkeys-missing-swing-voters-understanding-the-results-of-the-2018-turkish-elections/
[6] OECD (n.d.) 'History of DAC Lists of aid recipient countries' Available at: http://www.oecd.org/dac/stats/historyofdaclistsofaidrecipientcountries.htm
[7] World Bank (n.d.) 'GNI per capita, Atlas method (current US$) Available at: https://data.worldbank.org/indicator/NY.GNP.PCAP.CD?locations=TR
[8] https://www.oecd.org/dac/dac-global-relations/turkeys-official-development-assistanceoda.htm
[9] World Bank (2020) 'Turkey' Available at: https://data.worldbank.org/country/turkey
[10] World Bank (2020) Global Economic Prospects.
[11] World Bank (2020) 'Inflation, consumer prices (annual %) – Turkey' Available at: https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=TR

Figure 2: GDP growth in Turkey and the Europe & Central Asia region, 2000-2018



Source: World Bank.

The government's latest long-term plan, Vision 2023, was published in 2011 and includes a list of development targets to be achieved by 2023, the 100th anniversary of the Turkish Republic. Its targets focus on the economy, tourism, education and research and development (R&D), among other areas. Vision 2023 covers R&D, human resources, science, and the technology sector. The strategy includes devoting 3% of GDP to R&D expenditure and increasing the number of full-time equivalent researchers[12] in Turkey from 72,109 in 2011[13] to 300,000. Its microeconomics, entrepreneurship and industrial policies include R&D and innovation support of up to USD 130,000 for small and medium-sized enterprises (SMEs). The main R&D target areas included in Vision 2023 are outlined in Box 1.[14]

[12] The Full-time equivalent of R&D personnel is defined as the ratio of working hours actually spent on R&D during a specific reference period divided by the total number of hours conventionally worked in the same period by an individual or by a group. (For example, a person who devotes 40 % of his time to R&D is counted as 0.4 full-time equivalent)

[13] UNESCO (n.d.) 'Turkey' Available at: http://uis.unesco.org/en/country/tr?theme=science-technology-and-innovation

[14] Republic of Turkey Prime Ministry (n.d.) Turkey Vision 2023 ppt. Available at: https://www.turkey-japan.com/business/category1/category1_70.pdf (Accessed: 19/02/21)

Box 1. Vision 2023 – R&D and Innovation section targets[15]

- R&D expenditures: 3% of GDP.
- 2/3 of R&D expenditure by the private sector.
- Number of full-time equivalent researchers: 300,000.
- Developing manned rockets and national satellites.
- National centres of excellence.
- Venture capital and angel investor to link R&D and business ventures.

In 2018, the 11th National Development Plan for 2019 to 2023 was released by the Ministry of Development. This was the first development plan released within the new presidential system. **The plan revised macroeconomic targets in light of the worsened economic situation.** Compared to the 10th National Development Plan (2014 to 2018), there were changes in major economic targets, such as GDP, GDP per capita, exports, and unemployment rate. The policies outlined in the 11th International Development Plan cover the entire economy, industrial production, human resources, environment and justice, and focus on increasing production efficiency and improving national competitiveness.

Table 2: Changes in targets between 10th and 11th National Development Plan

10th National Development Plan for 2014 - 2018	11th National Development Plan for 2019 - 2023
By 2023: • to increase GDP to 2 trillion dollars. • to increase GDP per capita to 25,000 dollars. • to raise exports to 500 billion dollars. • to reduce unemployment rate to 5 percent. • to pull down the inflation rate permanently to lower, single digit levels (9.9%).	By 2023: • to increase GDP to 1.08 trillion dollars. • to increase GDP per capita to 12,484 dollars. • to raise exports to 226.6 billion dollars. • to reduce unemployment rate to 9.9 percent. • to pull down the inflation rate permanently to lower, single digit levels (5%).

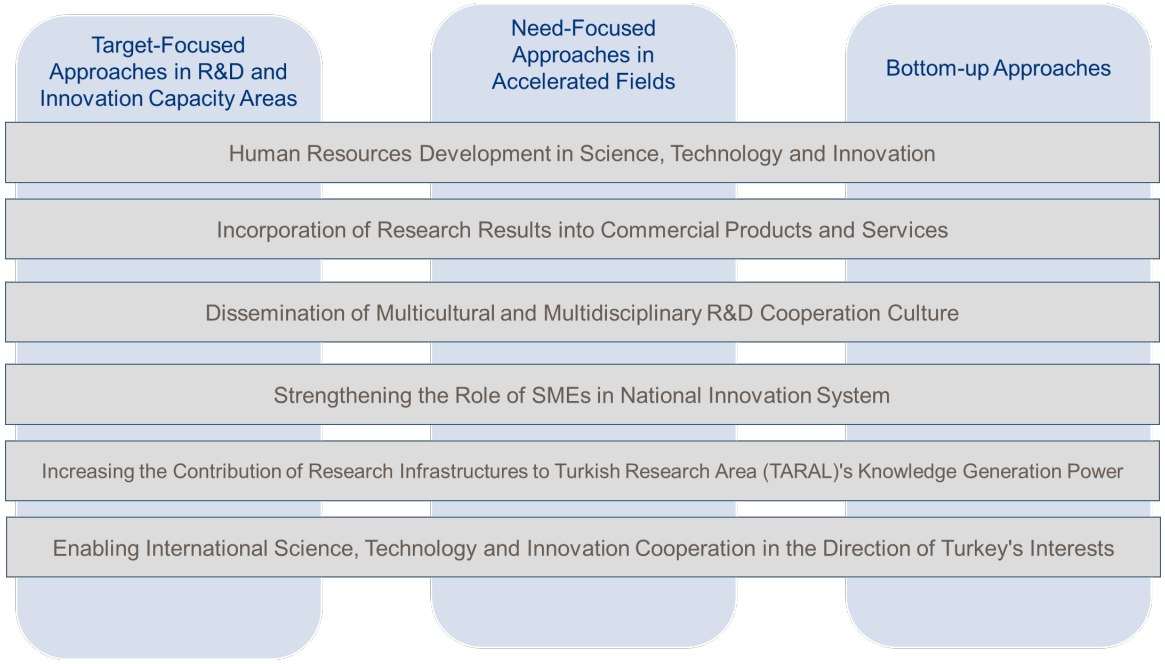
Source: The 10th National Development plan and Daily Sabah, 'Latest development plan lays out Turkey's 2023 ambitions for energy, digital transformation' Available at: https://bit.ly/3bQ3oXT

2.2 Research and innovation (R&I) landscape

[15] Republic of Turkey Prime Ministry (n.d.) Turkey Vision 2023 ppt. Available at: https://www.turkey-japan.com/business/category1/category1_70.pdf (Accessed: 19/02/21)

As of when this case study was written, the most recent science and innovation strategy was the National Science, Technology and Innovation (STI) Strategy for 2011 to 2016. The strategy had nine strategic objectives outlined in Figure 3.

Figure 3: The framework of National Science, Technology and Innovation Strategy



Source: TÜBİTAK. 2010. Ulusal Bilim, Teknoloji ve Yenilik Stratejisi (UBTYS) 2011-2016.

In the past two decades, the Turkish government has undertaken several activities to foster research and innovation collaboration, such as establishing Technology Development Zones, which came into force in 2001 with tax exemptions for R&D activities. Part of this work is also carried out by a government agency, the Technology Development Foundation of Turkey, which funds industry-university collaborative projects. Another initiative, Technology Transfer Accelerator Turkey, co-funded by the EU since 2014, aims to commercialise applied research from universities and scale up the technology transfer market in Turkey.[16]

According to the World Economic Forum's (WEF) 2019 Global Competitiveness report, Turkey ranks 61st out of 141 countries in the Global Competitiveness Index, a decrease from 45th out of 144 in 2014. In 2019, Turkey's performance was mixed: the country made significant progress in some dimensions while losing some ground in others. Turkey made advances in health, infrastructure and market size. At the same time, the country has seen a deterioration of its macro-economic environment. According to the report, lowering inflation will be one of Turkey's key challenges to improve its competitiveness.[17]

Gross domestic expenditure on research and development (GERD) as a percentage of GDP in Turkey has recently increased, reaching 1.03% in 2018, up from 0.86% in 2014.[18] The private sector financed 60.4% of GERD, followed by higher education (30.3%).

The European Innovation Scoreboard 2019 classifies Turkey as a Moderate Innovator (with innovation performance between 50% and 90% of the EU average[19]). Turkey was classified as

[16] EIF, Latest development plan lays out Turkey's 2023 ambitions for energy, digital transformation. Available at: http://www.eif.org/what_we_do/resources/tta/index.htm
[17] World Economic Forum (2019) 'Global Competitiveness Report 2019'.
[18] UNESCO, 'Institute for Statistics' Available at: http://data.uis.unesco.org/
[19] The European Innovation Scoreboard measures the performance of EU national innovation systems based on an unweighted average of 27 indicators every year. Countries fall into 4 performance groups, depending on their

a Modest Innovator (with innovation performance below 50% the EU average) in 2014, but its relative performance increased from 46% in 2014[20] to 62% in 2019.[21] At the start of the Newton Fund in 2014, Turkey's relative performance in all dimensions was below 70%, except for 'finance and support (72%)' and 'firm investments' (129%)[22,23]. As of 2019, Turkey's relative performance in terms of finance and support decreased to 44.9%, but the country continued to perform well in 'firm investment' (88.6%). The strongest performance was seen in the 'innovators'[24] indicator, which reached 151% in 2019.

As outlined in Table 3, Turkey's research output shows a high specialisation in the agricultural science, health services, maths, physics and natural resources and conservation fields. Compared to the 2014 figure, Turkey's performance increased for most sectors, except for Health Services, Astronomy, Materials, Physics, and Natural Resources and Conservation. Turkey's most specialised research field in 2018 was Physics, while the specialisation score of Astronomy was well below the global average.

Table 3. Turkey's specialisation in selected research fields

	2013	2014	2015	2016	2017	2018
Agricultural Science	1.29	1.33	1.37	1.41	1.43	1.48
Astronomy	0.34	0.34	0.27	0.30	0.31	0.28
Biology and Biomed	0.76	0.77	0.77	0.86	0.87	0.85
Chemistry	0.91	0.84	0.78	0.84	0.87	0.92
ICT	0.73	0.77	0.75	0.76	0.87	0.84
Engineering	0.72	0.64	0.67	0.75	0.84	0.80
Health Services	1.65	1.66	1.66	1.53	1.36	1.37
Materials	0.96	0.96	0.83	0.89	0.90	0.71
Maths	1.52	1.37	1.21	1.28	1.30	1.41
Physics	2.61	2.93	2.68	2.42	2.23	1.84

performance relative to the EU average: 1) Innovation Leaders: innovation performance above 120% of the EU average; 2) Strong Innovators: innovation performance between 90% and 120% of the EU average; 3) Moderate Innovators: innovation performance between 50% and 90% of the EU average; and 4) Modest Innovator: innovation performance below 50% of the EU average.

[20] European Commission (2015) Innovation Union Scoreboard 2015.

[21] European Commission (2019) European Innovation Scoreboard 2019.

[22] The 'finance and support' dimension consist of R&D expenditure in the public sector and venture capital expenditures. The 'firm investments' dimension consists of R&D expenditure in the business sector, non-R&D innovation expenditures and enterprises providing ICT training.

[23] European Commission (2015) 'Innovation Union Scoreboard 2015'.

[24] The innovators dimension consists of SMEs product/process innovations, SMEs marketing/organisational innovations and SMEs innovating in-house.

Natural Resources and Conservation	1.25	1.15	1.36	1.07	1.21	1.04
Psychology	0.31	0.29	0.33	0.36	0.55	0.67
Social Sciences	1.04	1.13	1.08	1.09	1.10	1.33
Geosciences, atmospheric, and ocean sciences	0.45	0.46	0.53	0.46	0.56	0.57

Source: Scopus (data sourced from U.S. National Science Foundation).
Note: the figure represents a measure of concentration of a country's publications in a field, by dividing the fraction of publications in a country that are in a certain field by the equivalent global fraction. A score higher than 1 shows that the country is more specialised than the global average, and a score lower than 1 shows that the country is less specialised.

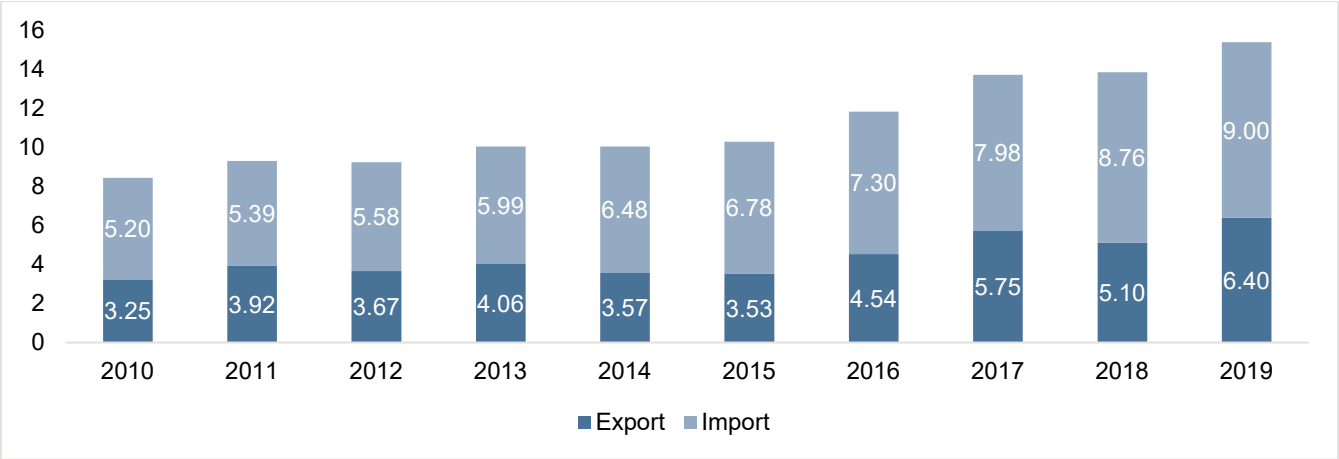
2.3 Turkey – UK relations (bilateral relations)

When describing the relationship between the UK and Turkey, both governments use the word 'strategic', with trade, security, and defence cooperation at the heart of the relationship.[25] The 2010 Strategic Partnership Document, which was signed during Prime Minister Cameron's visit to Turkey in July 2010, set out a road map for a wide range of concrete areas of cooperation to strengthen the two countries' strategic partnership.[26]

During the evaluation period, trade volume between Turkey and the UK increased by 53%, from £10.06 billion in 2014 to £15.40 billion in 2019. As of 2018, the UK was Turkey's second-largest trading partner after Germany.[27] In 2019, the top three import goods from Turkey were machinery and transport equipment (44.9%), miscellaneous manufactures (21.5%) and material manufactures (19.0%). UK exports to Turkey mainly comprise machinery and transport equipment (36.1%) and chemicals (13.1%).[28]

Figure 4. Turkey - UK trade in goods

[25] Parliament UK (n.d.) 'A "strategic" relationship, and its implications for Turkey and the UK' Available at: https://publications.parliament.uk/pa/cm201617/cmselect/cmfaff/615/61506.htm
[26] Ministry of Foreign Affairs (n.d.) 'Relations between Turkey and the United Kingdom' Available at: https://www.mfa.gov.tr/relations-between-turkey-and-the-united-kingdom.en.mfa
[27] Hurriyet Daily News (2020) 'Turkey, UK eye post-Brexit trade boom with agreements' Available at: https://www.hurriyetdailynews.com/turkey-uk-eye-post-brexit-trade-boom-with-agreements-151991
[28] Data extracted by Office for National Statistics UK.



Source: Office for National Statistics UK. Unit: billion £

2.4 R&I landscape/infrastructure in Turkey

The Scientific and Technological Research Council of Turkey (*Turkiye Bilimsel ve Teknolojik Arastirma Kurumu*, TÜBİTAK) is the leading agency for management, funding and research in Turkey. TÜBİTAK acts as an advisory body to the Turkish government on science and research and the secretariat of the Board for Science and Technology, the highest STI policymaking body in Turkey, chaired by President Erdoğan. Its International Cooperation Department is responsible for the management of TÜBİTAK's international programmes. Within TÜBİTAK, two departments deal with international cooperation: the Bilateral and Multilateral Relations Division and the EU Framework Programmes National Coordination Office.

In 2016, TÜBİTAK conducted a survey to identify priorities in the biomedical technology sector, gathering over 1,200 ideas from 300 researchers and experts. Based on the results of this survey, it developed new technology roadmaps and policy programmes.[29] Funding mechanisms have reportedly returned to normal after the political challenges of 2016. There has been a noticeable reorientation of the government to focus science-related funding on areas considered to be important for development.

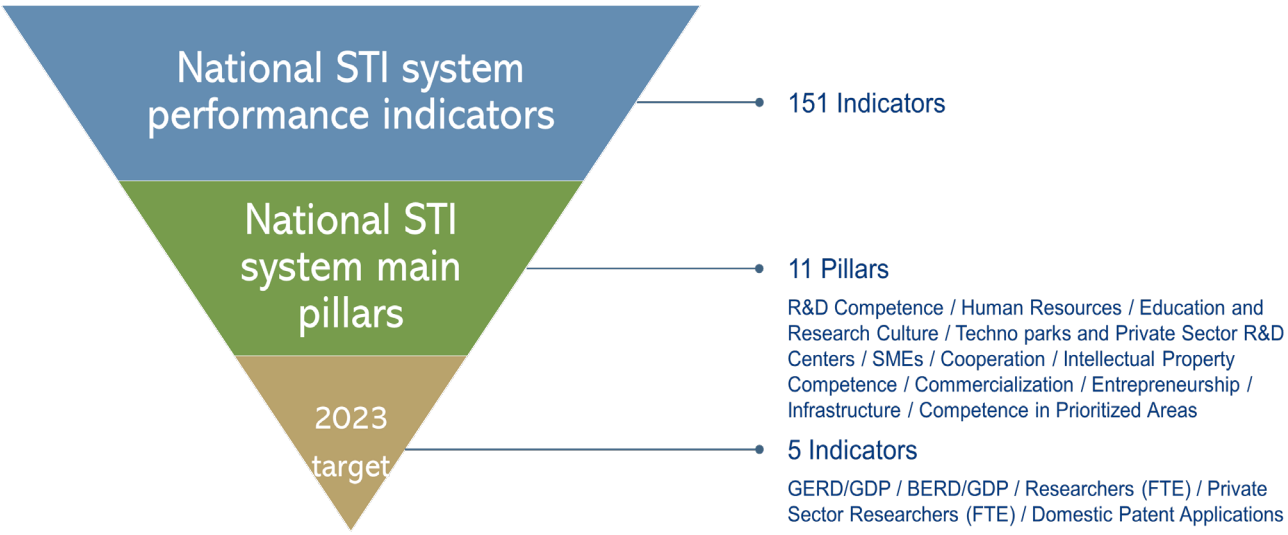
2.5 Monitoring and evaluation (M&E) systems

The Ministry of Industry and Technology (MoIT) undertakes evaluations of public R&D initiatives through impact assessment studies. Turkey regularly undertakes a Community Innovation Survey (CIS) for its biennial national innovation survey through the Turkish Statistical Institute, in line with internationally recognised Oslo Manual guidelines and the methodology used for innovation surveys in EU member states. According to the OECD, all questions in the CIS are in line with EU standards.[30]

According to TÜBİTAK, there are 151 indicators relevant to Turkey's national science, technology, and innovation system, summarised in Figure 5 below.

Figure 5: National STI system indicators

[29] OECD (2018) OECD Science, Technology and Innovation Outlook 2018.
[30] OECD (2013) Innovation survey metadata: Wave 2006-2008. Paris: OECD Publishing.



Source: TÜBİTAK. 2016. Turkish National Research & Innovation System ppt

2.6 International relations and research collaborations

Turkey has long-standing international cooperation programmes with several countries.

TÜBİTAK coordinates international collaboration under the Newton Fund. TÜBİTAK also coordinates joint calls with other countries for projects in different scientific fields.

Turkey takes part in a variety of European research programmes, such as COST (European Cooperation in Science and Technology) and EMBC (European Molecular Biology Conference). TÜBİTAK is also the contact organisation for the EU's Horizon 2020 programme. Table 4 shows other non-UK funding initiatives similar to the Newton Fund.

Table 4: Summary of major funding initiatives similar to Newton

Funding initiative	Description of activity	
Participation in European research programmes	COST (European Cooperation in Science and Technology)	A funding organisation for the creation of research networks with 38 members. This allows researchers from these countries to take part in international science and technology networks.
	EMBC (European Molecular Biology Conference) – funded by EMBO (European Molecular Biology Organization)	An inter-governmental organisation with 30 members. The organisation provides a framework for European cooperation in the area of molecular biology.
	Horizon 2020	Horizon 2020 is an €80 billion EU funding programme for research and innovation, which started in 2014. Its focus areas are multinational collaboration grants for research and innovation, individual grants for frontier research, fellowship and

		mobility grants, and innovation grants for SMEs. Horizon Europe (2021-2027) is scheduled to succeed Horizon 2020, focusing on energy efficiency initiatives.
TÜBİTAK fellowships	TÜBİTAK has funded fellowships for Turkish PhD and postdoctoral students since 1978, including 10 fellowship programmes for foreign researchers. Over 4,000 researchers have been supported through these fellowships since 2000.	

Turkey is one of the founding members of **COST**, established in 1971. In 2018, Turkey received funding of about €700,000 via COST, with 66 short-term scientific missions, 159 people trained, and 15 trainers participating in networking activities.[31]

European Molecular Biology Organization (EMBO) funds EMBC programmes and activities. EMBO has two fellowship programmes: a long-term programme providing funding for postdoctoral research for up to two years and a short-term fellowship fund for exchange programmes of up to three months. From 2014 to 2018, 13 researchers took part in the long-term fellowship programme, while 23 people received short-term funding. In 2018 alone, 12 people received short-term funding, with four conducting their research in the UK. [32]

Turkey received €544 million in 2018 through **Horizon 2020**,[33] which involved 895 organisations and 153 small and medium enterprises. Turkey collaborates with several countries via Horizon 2020, Spain being the most frequent partner and the UK ranking 5th.[34]

Since 1978, **TÜBİTAK** has provided a set of fellowship programmes for Turkish PhD and postdoctoral students. In 2013, there were 29 programmes for science research, of which ten were international fellowships inclusive of foreign researchers (these ten were organised under a separate International Graduate Scholarship Programme). Almost 4,000 researchers have been supported through these fellowships since 2000, with 75 million Turkish lira (approx. £18 million) allocated to researchers for their studies outside of Turkey for a maximum of one year.[35]

The TÜBİTAK National Metrology Institute (TÜBİTAK UME) aims to "*ensure the reliability of all measurements conducted in Turkey, to make provisions for the integration of these measurements into the international system and to develop existing and new measurement technologies".*[36] TÜBİTAK UME conducted 53 R&D projects in 2018, and 38 of them were co-funded by the EU.[37] The number of projects has decreased compared to the number of R&D projects in 2014 (83).[38]

[31] COST (2018) Turkey.
[32] EMBO facts & figures (2017-2018)
[33] European Commission (2020) 'Financial Transparency System' Available at: https://ec.europa.eu/budget/fts/index_en.htm
[34] European Commission, 'Turkey Horizon 2020 country profile' Available at: https://webgate.ec.europa.eu/dashboard/extensions/CountryProfile/CountryProfile.html?Country=Turkey
[35] OECD. 2014. International Survey and Database on Science, Technology and Innovation Policies.
[36] https://www.ume.tubitak.gov.tr/en/kurumsal/who-we-are
[37] TÜBİTAK UME. (2018). Annual Report 2018.
[38] TÜBİTAK UME. (2014). Annual Report 2014.

2.7 The Newton-Katip Çelebi Fund in Turkey

Through the Newton Fund, the UK is investing £4 million every year in R&I partnerships between Turkey and the UK.[39] TÜBİTAK is the main Delivery Partner of the Newton Fund in Turkey. UK implementing organisations active in Turkey includes the British Academy, Royal Academy of Engineering, Royal Society, British Council and UKRI.[40]

Since the beginning of the Fund in 2015, the Newton-Katip Çelebi has maintained a strong focus on innovation and research collaboration, managed in line with the UK Research Councils' peer review systems.

In 2014, the proposed balance of activities in Turkey, according to Newton Pillar, was: 40% People, 40% Research, and 20% Translation. There have been no reported changes in the programme's priority areas, which are:[41]

- Lifelong Health and Well-being (including antimicrobial resistance, disease prevention, diagnostics, prevention, and health education).
- Agriculture and Global Food Security (including improved yields, disease eradication, water security, and supporting women in the labour market).
- Disaster and Emergency Management (including earthquake early warning systems and geological monitoring, information systems, and development of resilient materials).
- Energy and Climate Change (including renewables, clean coal, efficiency, smart grids, and green transportation and buildings).
- Social Sciences and Humanities (Cross-Cutting).

[39] UK Science & Innovation Network (2016) UK Science & Innovation Network Country Snapshot: Turkey.
[40] GOV.UK, 'The Newton-Katip Celebi Fund: Turkey' Available at: https://www.gov.uk/guidance/the-newton-katip-celebi-fund-turkey#history
[41] Newton Fund, 'Turkey' Available at: http://www.newtonfund.ac.uk/about/about-partner-countries/turkey/

3 Emerging impacts of the Newton-Katip Çelebi Fund in Turkey

This section sets out the emerging results of the Newton-Katip Çelebi Fund in Turkey. The findings are based on the three calls included as part of the case study as well as the broader consultations undertaken with the programme team (see Section 1.4 for details of the methodology).

3.1 Key findings

The Newton-Katip Çelebi Fund has strong potential to deepen diplomatic relations and science and research collaborations between the UK and Turkey. The Fund is relevant to some of Turkey's most pressing socio-economic challenges, such as the Syrian refugee crisis, public health, and renewable energy generation. Newton-Katip Çelebi collaborations address the priorities of the Turkish government and its international commitments, and the Fund builds links between researchers in the two countries. Some projects have informed the work of policymakers, international organisations working in Turkey and civil society organisations.

The Newton-Katip Çelebi Fund has had a positive effect the working practices of Turkish Delivery Partners by encouraging them to establish protocols for bilateral research. The Fund has also incentivised Turkish partners to change national legislation to allow for bilateral international research partnerships - pioneering a previously unexplored avenue of research. Turkish partners have also been receptive to applying UK strengths in science and innovation applications, for instance, learning from the UK's experience in mainstreaming creative industries into other economic sectors.

The programme allowed UK partners to increase their familiarity with Turkish institutions and areas of expertise, including areas that are a high priority for the UK's foreign policy, such as humanitarian responses to the Syrian refugee crisis. Lessons learned from partnerships with Turkish institutions can be applied to further collaborations with Turkey and other countries facing similar challenges.

The Newton Fund's work in Turkey has been effective in laying the groundwork for further R&I collaboration. It has developed a more effective approach to forging partnerships in Turkey and is starting to position the UK as 'partner of choice' for Turkey in certain research areas where it is seen as particularly strong, such as artificial intelligence (AI) and creative industries. Other programmes – such as Horizon 2020 and its successor, Horizon Europe – continue to be larger in size than Newton and may continue to have a stronger brand name in the country.

The Newton-Katip Çelebi Fund's greatest strength is fostering and creating high-quality research collaborations. The strongest added value for Turkish partners lies in building research collaborations with experienced UK academics. The Fund has created opportunities for Turkish students to continue their studies in the UK, strengthening personal collaborations and interactions between academic institutions in the two countries. This should continue in the future.

The Fund in Turkey excels at capacity building, which is strongly embedded in project design, in its strengthening of institutional links between universities and research networks, and in its ability to draw on research excellence from both countries. All three

projects sampled for this case study have established institutional partnerships and solidified people-to-people relations, building research networks in specialised areas – namely, refugee issues, computer optimisation models or novel medical treatment algorithms. Each project uses innovative research methods or is trying to address pressing social problems through new approaches.

Newton contributes to evidence-based policymaking. Although direct translation of research to policy continues to prove difficult due to the traditionally limited collaboration between academia and government in Turkey, there are reports of interest from INGOs and local government in proposed policy directions or technical solutions offered by Newton collaborations, including from the three sampled projects.

Respondents appreciated the ease of application processes and flexibility of projects, reporting that the scope of the Fund provides for adapting project parameters in line with emerging findings and changing contexts.

Newton's focus on localised, sub-national issues is a key area of strength of the programme, rendering it highly relevant to local partners and local research priorities. Collaboration through the Fund led to knowledge transfer in areas of UK excellence and raising interest in those research areas among Turkish partners.

Despite early signs of a strengthened partnership, the UK is not yet in the 'partner of choice' in R&I collaborations in Turkey. The USA continues to have a dominant role in people-to-people collaborations and direct academic links with Turkey, while EU funding tends to be larger-scale and longer-term. Although well-managed by the Newton-Katip Çelebi Fund ICT, there was a lower than anticipated level of interest from UK academic partners due to concerns about the feasibility of carrying out research in Turkey. Newton is starting to be seen as a strong alternative for Turkey's research funding, but **its funding bracket cannot compete with larger programmes such as Horizon 2020.**

Stronger coordination with other UK funds such as the Global Challenges Research Fund (GCRF) could help strengthen the UK's brand as a leading S&I partner in Turkey. Although the Funds are different in scope, additional efforts could be made to strengthen and highlight their complementarities.

The sustainability of collaborations with the UK will depend on continued engagement and the provision of further match funding and match effort. It will be important to increase contextual understanding and awareness of research feasibility among UK partners. Without additional direct support for collaboration activities, it will be difficult to sustain partnerships that remain relatively novel and smaller than other country initiatives.

There is scope for the Fund to further promote Turkish research excellence, particularly in the medical sciences and manufacturing industries. This could help to encourage more of a two-way knowledge transfer and showcase existing research excellence in Turkey. Although UK researchers view Turkey's research culture as strong, projects in our sample were generally designed to transfer knowledge and expertise from the UK to Turkey rather than the other way around. The UK research community could further benefit from the highly relevant, experimental and innovative research that is being carried out in cross-disciplinary areas in Turkey.

There is scope for the Fund to focus further on research uptake. Although fostering on the ground change is already a Newton objective, research calls could be designed to further test solutions, models or policy advice in real-life situations, and attempts could be made to take

the outputs or disseminate them actively to elicit interest from decision-makers. In the sampled projects, research activities mostly stopped at the stage of producing models or prototypes and writing up findings or following capacity building workshops and events. Impact could be enhanced by promoting general market or policy uptake through actively reaching out to policymakers or private companies. Future calls could include criteria around potential research uptake.

4 Project: Interdisciplinary Research Links for Medical Artificial Intelligence (AI) - Management of Musculoskeletal Injury

Summary

Project title	Interdisciplinary Research Links for Medical AI: Management of Musculoskeletal Injury
Call title	Institutional Links
Short description	Musculoskeletal (MSK) conditions are the dominant source of chronic pain worldwide and the basis for the most common pain complaints presented to primary care. Clinical decisions on MSK treatment often ignore the latest clinical evidence as it is difficult for busy clinicians to keep up to date with new research. This project aimed to create a computerised decision support tool to assist therapists and doctors in making evidence-based predictions during injury treatment. The project investigated the challenges of how an artificial intelligence system can support healthcare providers in injury treatment.
Objective(s)	The project's objective was to develop a novel and simpler method of eliciting information for an AI model assisting with decision-making and treatment of MSK injuries. Additional objectives include: • setting up an institutional link between Hacettepe University and Queen Mary University of London in the field of medical decision support. • improving the capacity of Hacettepe University researchers, decision scientists and clinical experts to work together, which is critical to the successful use of eHealth. • creating a prototype of an MSK system that in the future could support physiotherapists in remote areas of Turkey where health personnel are often in short supply or in overburdened hospitals. • providing a case study in developing AI/eHealth solutions in Turkey, allowing these technologies to become more widely known.

	• testing the social and economic benefits of eHealth solutions in a non-European healthcare system. • testing and refining the existing MSK AI, developed in the UK by Queen Mary University, in the Turkish healthcare context. • evaluating whether the AI's 'intelligence' is fully generalisable or contains features specific to the UK environment.
Pillar	Research
Action value (total budget allocated in country, in GBP)	£ 140,520 (UK funding) £ 33,559 (Turkey funding)
Start/end date (Status: ongoing or complete)	Status: Completed Start date:12/02/2018 End date: 14/02/2020
DP UK and overseas	British Council (UK) and the Scientific and Technological Research Council of Turkey – TÜBİTAK (Turkey)
Award holders/grantees	Hacettepe University (Turkey) Queen Mary University of London

Description of the project

The programme provided grants for the development of research and innovation collaborations between the UK and partner countries, tackling local development challenges in diverse fields.[42] This collaboration, jointly funded and managed by the British Council and TÜBİTAK, focused on developing and perfecting AI methods to improve access to quality healthcare in Turkey.

Musculoskeletal (MSK) conditions present an increasing burden on the healthcare sector, particularly in countries with ageing populations. In Turkey and the UK alike, elderly populations are increasing at much higher rates than the general population. Between 2014 and 2019, Turkey's elderly population increased by 21.9% (Turkstat)[43]. Further, the number of clinicians per capita in Turkey is smaller than in most European countries. The combination of these factors has meant that MSK issues have been presenting a greater burden on the healthcare sector and on Turkey's ageing population.

Computerised support tools can provide evidence-based predictions and inferences that can assist decision-makers with their diagnoses and clinical treatment plans more effectively. More

[42] British Council, 'Institutional Links' Available at: https://www.britishcouncil.org/education/science/institutional-links
[43] Turkstat (n.d.) Available at: https://www.tuik.gov.tr/Home/Index

specifically, information technology and AI can help make better use of scarce medical resources in remote areas. However, previous efforts made to improve diagnosis via computer tools of pattern recognition or other analytical approaches have had limited success until the inception of this project. This project sought to develop an MSK decision support tool (an AI tool, more specifically a computer algorithm) to support healthcare practitioners, with the added potential for the system to be used directly by patients to manage simple conditions. The use of this novel algorithm could be introduced in Turkey to reduce the burden on healthcare practitioners.

As shown in Figure 6, Annex 4, the project's Impact Logic is as follows:

- **Activities:** To develop the MSK decision support tool, several different elements needed to be addressed. First, the project team needed to develop a smart and effective algorithm. If this algorithm could identify the problem, it could suggest a treatment option. It was not meant to replace or take over the clinicians' roles but rather to support decision-making. This algorithm also needed to be developed in tandem with appropriate interfaces, accessible for both clinicians and patients. In its development, it was essential the algorithm be able to predict accurately, and for this, the team needed patients' perspectives to ultimately develop the decision-making interface. Other activities included visits to the UK and Turkey. As part of the UK team's visit to Turkey, around 400 medical experts and students took part in conferences and workshops on AI's potential in the medical field. Various workshops were also held with AI scientists, medical researchers, and policymakers, who also presented their work, potential collaborations and methods to develop AI tools.

- **Expected outputs:** This project's main expected output was a refined and tested MSK AI tool, for application to the Turkish context. The research process would help evaluate whether the AI's 'intelligence' is general enough to work effectively in different environments or if it contains features that make it more applicable to the specific UK environment. This project sought to develop a decision support system (DSS) to diagnose and recommend treatments for MSK conditions. At the conclusion of this project, the team aimed to have a prototype DSS, evidence for its performance, a clear understanding of its potential applications, preliminary evidence of its clinical use, and most importantly, an established partnership between technologists and clinicians. There have been multiple visits between Turkey and the UK, and a joint project website has been created for presentations and working papers. Some of the expected deliverables are reports and publications in peer-reviewed journals on the requirements for an MSK support tool in urban and rural situations, on initial clinical evaluations of the prototype interface, and on the analysis of the potential impact on reducing treatment cost. Publications on conferences and contributions to journal publications will also contribute to the literature on MSK treatment.

- **Expected outcomes:** Since research collaborations between health sciences and engineering faculties is limited in Turkey, one of the main objectives of this project was to foster interdisciplinary work and research. The project hoped to improve the collaboration between Turkey and the UK, between decision scientists and MSK clinical researchers, and between computer science and medical departments within and across Turkish and UK universities. It hoped to establish an institutional link between the participating universities, Hacettepe University and Queen Mary University of London, for AI in medical decision support. It also sought more specifically to improve Hacettepe University's capacity to conduct interdisciplinary research to develop novel health technologies.

- Once applied in practice, the tool could also lead to improved health outcomes among the Turkish population. There is limited access to physiotherapy services in remote areas due to the short supply of medical personnel. For this reason, using AI to increase the accessibility of knowledge of MSK treatments and diagnoses was seen as having the potential to improve healthcare quality. If the AI tool can provide evidence-based triage, it could refer patients with severe MSK conditions to specialist clinics, while its decision support aspect could recommend more appropriate exercises. This consequently would decrease the burden of care for physiotherapists and rheumatologists by preventing inaccurate referrals. The tool may also reduce the incidence of incorrect treatments recommended by non-specialists unaware of the latest clinical evidence.

- **Expected impact:** Ultimately, this project aims to improve musculoskeletal conditions, predominant in both the UK and Turkey due to their aging populations. In the long run, the project aims to contribute to improved access to healthcare in Turkey and the UK, resulting in improved health and well-being. The project aims to provide a case study on developing AI/ Health solutions in Turkey, sharing these technologies to a wider audience, and enabling the development of similar technologies for other critical problems in healthcare in Turkey and abroad.

4.1 Emerging project results

Relevance of Newton Fund activities

ODA relevance

The project is directly relevant to the Newton Fund-level objectives, Turkish policy priorities and existing R&D strengths, as well as overarching ODA objectives. The project's stated aim is to develop links for developing viable healthcare-related AI and decision support tools and strengthening healthcare provision in Turkey. This addresses the first priority of the Newton-Katip Çelebi Fund: Lifelong Health and Welfare. Developing solutions to strengthen the treatment of MSK injuries in remote areas, where doctor availability is low, speaks to the potential to cover the lifelong health and welfare of Turkish citizens whose access to quality treatment of mechanical injuries is limited. The software created by the project also has the potential to reduce the overburden of doctors in urban hospitals, which could impact the lifelong health and well-being of a greater number of urban residents.

The project also links directly to Turkey's well-established strength in medical sciences. According to the World Economic Forum Global Competitiveness Report (2019), Turkey has made particular progress in recent years in developing healthcare excellence. Furthermore, Turkish research outputs data for 2014 to 2018 show a particular concentration of research outputs in health-related topics, exceeding the global average. While national research development plans do not directly list specific sectors of priority for the Turkish government, instead focusing on enhancing the competitiveness of the overall R&D landscape, Vision 2023 acknowledges Turkish medical excellence and promotes medical tourism to Turkey as a potential motor for the economy in the next few years.

The project aligns with Sustainable Development Goal three: Good Health and Well-Being, with particular potential to contribute to ensuring healthy lifestyles and promoting well-being for all by reducing health inequalities across socio-economic groups and different areas of the country.

Origins and quality of the collaboration

The project's origins lie in the UK, where a team of decision scientists at Queen Mary University developed an MSK decision support tool that enables estimates of the severity of patients' biomechanical and psychosocial conditions. This tool could also predict the outcomes of alternative treatments to the one proposed by a specialist. The project team decided to use the model developed in the UK and apply it to Turkish conditions and different medical practices in order to validate it and modify it as necessary. The work resulted in the creation of three computer models: i) a programme to capture existing clinical knowledge and encode it into an AI-readable format, ii) a prototype of the decision-making tool (or software), and iii) a prototype of the interface of the decision making-tool that could be used by the wider MSK community, as further explained in the sections below.

Additionality

This project has forged research partnerships that would not have happened otherwise. It brought together three separate elements – interdisciplinary collaboration, capacity building and international cooperation. This would not have been possible under different funding opportunities. Interviews suggested that while researchers working in decision science and medical science had previously collaborated on an *ad-hoc* basis in the Turkish implementing partner institution, these relationships were not formalised before this project. Through this collaboration, the pre-existing personal links between Turkish and UK researchers were institutionalised, with a view of continuing collaborations in the future in similar research areas. The project's design also enabled the engagement of students and post-doctoral researchers, with a strong emphasis on their capacity building. This was seen as a key added value of the programme.

4.2 Effectiveness of Newton Fund activities

Research collaborations on topics relevant to economic development and poverty reduction

The project created three prototype computer models and tools. The first is a prototype of a tool to capture existing clinical knowledge about musculoskeletal injuries and translating it into a code legible to standard AI applications. The second prototype is the actual model of the AI-based decision support tool, which evaluates patients' conditions and assesses proposed treatments. The third prototype models the potential interface of the decision-making tool, so that it can be used in practice by medical practitioners and patients alike. **All prototypes would require further research and expanded data sets to be operationalised and taken to market.**

The collaboration has resulted in publishing a conference paper entitled 'Towards an Evidence-Based Decision Support Tool for Management of Musculoskeletal Conditions', published in the journal 'Studies in Health, Technology and Informatics' in 2018. The paper evaluates the effectiveness of the decision-making tool and the Bayesian networking methodology underlying it. In 2018, the project also involved two reciprocal research visits in Turkey and the UK to further develop the prototypes and raise awareness of the initiative in Turkey.

The research team focused on the technical aspects of modelling and validation of the AI tools. **This improved their technical capacities and benefited their careers by raising their international profile.** The capacity building component had been planned at project design stage.

Translation of research into collaborative solutions to address development challenges

The research generated by the project should support medical practitioners and improve health outcomes in Turkey. However, further research and investment into the prototypes would be needed to take them to market. **The project has established links between AI and medicine in Turkey, which underpins continued development, testing and launching of the product.**

This project has not yet resulted in any unexpected or further outcomes. Work has progressed largely according to plan, with some reported minor setbacks. These included the inability of some Turkish researchers to secure visas in time for their visit to the UK and the COVID-19 pandemic resulting in a cancellation of one of the in-country visits in Turkey to wrap up the research. Beyond these delays the project was carried out to plan.

4.3 Emerging signs of impact

The model's clinical trial and the partnership between clinicians and technologists at Hacettepe are positive initial signs that the tool could be further refined to benefit the wider Turkish population. **The prototype has the potential for wider distribution**. Further research into how the tools can be applied in practice would be necessary to establish the link between the project and welfare gains. Since the prototypes are not yet at market-readiness stage, assumptions of the project's impact made during the proposal stage should be treated with caution.

There is potential for wider benefits, but only if substantial follow-up research were to be funded. There are no immediate plans for additional research at the time of writing this case study report. The core decision support prototype would need to be validated with a large-scale clinical trial approved by medical authorities, and before that, the prototype's usability and effectiveness tested among patients.

In terms of its impact on collaboration with the UK, it was highlighted that the project did not necessarily aim or need to change the UK's perception as a research collaboration partner, as it drew directly on UK expertise in applying AI tools to public health issues. Turkish partners already saw the UK as a pioneer in this field, and the work undertaken in the project has solidified this status by enhancing institutional links between partner institutions.

Signs of sustainability

Many of the project's perceived impacts are highly dependent on whether further research and testing of the prototype is continued. The impact envisioned at the design stage – namely, improving access to treatment of injuries in remote areas or reducing the burden on clinicians in over-crowded hospitals – is contingent upon the prototypes being tested and assessed by patients in additional small-scale trials, and potentially clinical trials later down the line. **If researchers decide not to pursue this direct avenue of research, it is unlikely that impact will be observed, and the sustainability of the work will be negatively affected**. However, the three prototypes could be taken up and further refined by other researchers were the tools to be placed in the public domain.

The project also included a capacity-building component. Three masters' level students and one post-doctoral researcher were hired to work on technical aspects of AI modelling and validation. One of the researchers has reportedly secured employment in a similar field. Furthermore, the Turkish team members reported that their capacity has grown as researchers in combined AI systems and medical sciences, which will benefit their work and teaching practice in future.

The collaboration between UK and Turkish researchers was underpinned by a strong partnership. Week-long visits to Turkey and UK improved the quality of the collaboration. Despite the project having formally finished, research teams are continuing to meet through weekly Skype calls, showcasing this partnership's strength. The partnerships forged under this project are expected to be sustainable in at least the short-term future, as evidenced by a joint application of the expanded UK team (including researchers from another UK institutions) and the Turkish team for an Advanced Fellowships Grant. Further, the project has reported the creation of formalised links between the Turkish project partner's engineering and medical departments, which increases the likelihood of further multi-disciplinary research collaborations in the future.

Complementarity and coordination

Interdisciplinary research has not been common in the Turkish context, despite widely recognised research excellence in specific domains. In this context, **this research project has been showcasing the potential held by multi-disciplinary research collaborations.** Academic clinicians in Turkey have high patient loads and are generally interested in tools that can assist them and reduce their burden, but many doctors are not aware of the potential benefits of AI innovations. Meanwhile, interdisciplinary research in computer science has been consistently improving over the past few years. The Newton Fund, and this project specifically, have started to change how this line of research is viewed in Turkey. The dissemination workshops, including with medical staff, carried out as part of this project are starting to show that interdisciplinary research between doctors and information and communications technology (ICT) personnel can be valuable.

As a result of this collaboration, AI scientists at the Turkish partner institution have started investigating opportunities to engage with other medical departments in the university hospital to potentially apply AI solutions to other medical fields. Interviewed stakeholders also praised the project's effectiveness – particularly through its dissemination workshop – in increasing awareness for what clinical AI can do for medical researchers, policymakers, medical practitioners, and patients. There are already positive signs of greater interest in interdisciplinary research, thanks to the Newton-Katip Çelebi Fund and this project.

4.4 Conclusions

- **The project shows direct relevance to the Newton Fund-level objectives**, Turkish policy priorities and existing R&D strengths as well as overarching ODA objectives due to its potential health benefits. The research collaboration focuses on a significant public health condition in Turkey, given its ageing population and inequality in access to quality healthcare across different areas. It has the potential to increase the quality of life in remote areas and among under-served populations.

- This project aimed to create a prototype of an AI-based decision support system for clinicians and injury treatment specialists to assist with treatment of MSK problems. It developed three complementary prototypes which can be used to identify, assess and treat MSK injuries. **All will require substantial additional research, testing and piloting to be taken to market.**

- **The project enhanced interdisciplinary research in Turkey.** Although research groups working on decision science and medical science had collaborated on an *ad-hoc* basis in the Turkish implementing partner institution in the past, these relationships were not formalised before this project. Through this collaboration, the pre-existing personal links between Turkish and UK researchers were formalised and institutionalised. The two

research teams have continued to collaborate informally following the end of the project and have a view of continuing to work together in the future. However, there are no immediate plans to continue the development of this specific prototype.

- Should the prototypes generated by this collaboration be further developed and brought to market, they could support physiotherapists in remote areas of Turkey where health personnel are in short supply or in overburdened hospitals. This would increase access to high-quality healthcare across the country. **Through further research, prototypes could also be adapted for use in other country contexts.** However, substantial additional investment in prototype development and testing is needed for any of these results to occur.

Lessons learned and points to consider going forward

- **The project brought about an increased emphasis on interdisciplinary research, through the Newton-Katip Çelebi Fund.** It enabled links between AI and medical departments in the Turkish partner institute and established a track record for further formal research collaborations between the information technology department and the university hospital staff. Institutional collaborations with UK partners have also been strengthened and are potentially sustainable. However, there are limited plans to continue working on the specific prototype and plans for further research collaborations are focused on other research areas.

- Despite being a Research Pillar collaboration, this project was cross-cutting and included People Pillar activities and objectives. **The project's design allowed the research team to engage students and post-doctoral researchers in activities directly and placed a strong emphasis on their capacity building.** This indicates a comprehensive project design and can encourage further international collaboration and multi-disciplinary research in the future.

- **Additional research and patient testing in a live clinical trial setting would be essential to assess the project's potential impact on the ground.** However, the potential impact on patients' health and the sustainability of the research outcomes are significantly affected by a lack of concrete plans for further prototyping. Having a longer-term collaboration, a prototype launch plan, additional funding for prototyping and market testing would support the translation of research findings into development solutions.

5 Project: Syrian Refugees in Turkey: Understanding Local Government Responses

Summary

Project title	Syrian Refugees in Turkey: Understanding Local Government Responses
Call title	Newton Advanced Fellowships (Year 5, Round 1)
Short description	This project seeks to analyse local government responses to the refugee crisis in Turkey and explain variation between localities. 90% of Turkey's 3.6 million Syrian refugees live in urban areas rather than camps, and their presence often creates social tensions. The research investigates how local governments address refugees' needs, especially Syrian refugees who are not granted official refugee status but are treated as 'guests'. Qualitative research identified and compared local policy discourses, how they relate to national and international refugee policies, and how they influence local services, infrastructure and community relationships. The Fellowship focuses on building qualitative researchers capacity in Turkey and their development in new methodological research skills.
Objective(s)	The project's stated objectives are to increase the capacities of the participating Turkish research team by providing advanced training in skills for qualitative research and building their capacity in qualitative sociological research. This aims to improve the Turkish research team's capacity to: • investigate local government responses to the ongoing refugee crisis in Turkey and explain variation in local responses. • shed light on differences in approaches to refugee treatment by national and local governments. • add to the discourse on viable policy approaches to the refugee crisis (drawing on conceptual and

	methodological lessons learned from the comparisons carried out during the study). • set up institutional links between the two partner institutions in the UK and Turkey
Pillar	People
Action value (total budget allocated in country, in GBP)	£61,745 (only UK funding)
Start/end date (Status: on-going or complete)	Status: Ongoing Start date:01/09/2018 End date: 31/08/2021
DP UK and overseas	British Academy (UK) and the Scientific and Technological Research Council of Turkey – TÜBİTAK (Turkey)
Award holders/ grantees	Işik University (Turkey) University of Birmingham (UK)

Description of the project

The 'Syrian Refugees in Turkey: Understanding Local Government Responses' project was funded as part of a Newton Advanced Fellowship. The fellowship aimed to improve the Turkish research team's skills in advanced qualitative methods, supporting them to carry out research on local government responses to the refugee crisis.

At the time the project was designed, Turkey was hosting about 3.6 million Syrian refugees. Despite the magnitude and complexity of meeting refugees' needs, the AHs perceived a lack of research on local policies toward refugees. The Turkish AH's research attempts to explain how refugees meet other refugees, look for jobs, and access public services at the local level, where they congregate outside of camps. Local municipalities in Turkey are responsible for services including infrastructure, transportation, waste management and social services. As such, they bear a significant cost with regard to hosting refugees and providing them with a range of public services.

The project applies a multi-level governance (MLG) approach, as an important share of international funding for refugees in Turkey is directed at municipalities and NGOs working at the local level. Local government response is an under-researched topic, with central government responses having received more academic attention to date. Local governments lack the necessary capacity and resources to address refugees' needs. Syrian refugees' presence is also becoming entangled with wider social cleavages, including secular and religious, Turkish and Kurdish, and Alawite and Sunni cultural lines. Municipalities may depart from national discourse at the local level due to ethnic, political, and ideological differences, particularly municipalities controlled by secular parties, which are often less inclined to host refugees. Since 2011, Syrian refugees have been accepted in Turkey as 'guests' and do not receive refugee status, meaning they are not granted refugee rights. This lack of a universal

rights-based refugee policy in Turkey leads to conflicting narratives and policies at the local level. Turkey bases its policy on 'generosity', underpinned by a religious discourse of hospitality and solidarity, rather than rights.

In this context, the Turkish AH's research focuses on how municipalities at the local level are developing diverse responses within this ambiguous and politically charged policy discourse and what effect this has on refugees. Different discourses employed include "partnership with civil society", "solidarity with Muslim siblings", "being a model for other municipalities", and a "rights-based approach to refugees". The research examined how these, and other discourses are used to create policies towards refugees at the local level, whether they are similar to any national and international policy discourses, and how they influence local services, infrastructure and community relationships.

The research involved interviews, data collection and document analysis. Four localities in two municipalities (Istanbul and Adana) were selected for fieldwork, using a bespoke sampling technique, guided by proximity to the Syrian border, employment patterns, and refugees' class structure.

A large number of semi-structured, in-depth interviews were conducted with national organisations (General Directorate of Migration Management, Disaster and Emergency Management Authority) and international NGOs working with local authorities and municipal actors, as well as with local agency representatives, NGOs (community, faith or rights-based) and community groups. The research team also carried out structured observations of municipal meetings, voluntary activities, and programmes at the community centres built for refugees. Other sources included documentary analysis of legal documents, think tank reports, government publications, websites, minutes, speeches, media appearances and social media accounts.

The Fellowship enabled the involvement of mid-career academics and a PhD student from Turkey in training sessions and research, contributing to the development of long-term cooperation between different research networks in Turkey and the UK, focusing on research on refugee issues.

Pathway to impact

As shown in Figure 7, Annex 4, the project's Impact Logic is cross-cutting and encompasses People and Research Pillar elements, as follows:

- **Activities:** Various workshops and seminars on research training held at the University of Birmingham's Institute of Local Government Studies (INLOGOV) were organised to build skills and knowledge in qualitative research methods among the Turkish research team. They also aimed to provide opportunities to share research findings and create links between the Turkish AH's network in Turkey and participants at the University of Birmingham. In terms of the AH's research itself, this is based on engaging with municipalities, local agencies, NGOs, and community groups to identify and compare policy discourses relating to refugees. As mentioned above, fieldwork included 50 semi-structured in-depth interviews and structured observations of municipal meetings, voluntary activities, and events in the community centres built for refugees. Findings were to be further enhanced by documentary analysis of legal documents, reports, government publications, speeches, and other sources. The research team also planned to hold policy seminars at Isik University in Istanbul to share findings with practitioners, academics, and media in Turkey.

- **Expected outputs:** This research programme planned to produce two international conference papers. The first paper would discuss the methodological challenges and issues surrounding research design. The second paper would focus on conceptual lessons learnt from applying interpretative phenomenological analysis (IPA) and MLG frameworks to understand local refugee policy. The project also hoped to develop policy reports in Turkish and English, summarising research findings and policy implications, two international journal articles, a project website and blog to increase the visibility of the research and to make its findings available to a wider audience beyond the academic and policy community, and hold seminars to learn, share findings, attract media interest, and increase research impact.

- **Expected outcomes:** This project has two main objectives i) to improve capacities in specialised qualitative research methods among participating Turkish researchers and ii) to investigate local government responses to the ongoing refugee crisis in Turkey, analysing these variations. Through these two components, it sought to enable knowledge transfer and capacity building and improve research capabilities. To build technical capacities and enhance the career development of early- to mid-career academics in Turkey, researchers were invited to attend training sessions at the University of Birmingham. This also aimed to support long-term cooperation between the Institute and the AH's network in Turkey, including her own institution, Işik University. Broader capacity strengthening in Turkish institutions was also anticipated but was contingent on participating individuals' further cascading their learning to others following their visits. British researchers were also expected to benefit from this collaboration by gaining more access to local knowledge and new field research about refugee policies at the local level. The research process and findings were expected to provide academics with a comparative perspective on refugee policies. The dissemination of these research results was expected to increase the visibility of Işik University and the University of Birmingham.

- **Expected impact:** Investigating the differences in policy discourses at the local, national and international level was expected to build research expertise on potential policy responses due to Turkey being a major refugee host country. The research hoped to facilitate learning between local authorities, identify effective practices, and generate evidence for advocacy efforts. This research was seen as having the potential to support Syrian refugees' integration into Turkish society and Turkey's economy. By analysing different discourses and policies surrounding refugees in Turkey, it was seen as helping to move beyond one-size-fits-all approaches to refugee integration. There is potential for this project's learning to be applied beyond Turkey, for instance, among other neighbouring host countries and European countries facing higher numbers of refugee arrivals. New research evidence could help develop policies that support refugees in a more inclusive, equitable, and effective way.

5.1 Emerging project results

Relevance of Newton Fund Activities

Activity targeting and ODA relevance

This project is directly relevant to the pressing socio-economic issues posed by the influx of Syrian refugees, which had widespread impact on Turkey. While transnational migration and refugee treatment are not included in the government's national development strategies, both have emerged as important priorities of the Turkish government and the international community alike in the aftermath of the Syrian conflict. Understanding local government responses to refugee treatment is crucial in meeting the challenges related to their integration into Turkish society, given tensions around secular and religious divisions as well

as Turkish and Kurdish relations. This project provides an important avenue to investigate pressing societal challenges in a context in which Syrians are accepted as temporary guests but are not awarded official refugee status.

The project fits into the UN's SDG framework guiding ODA assistance priorities and its pledge to 'leave no one behind' and disaggregate the achievement of relevant SDGs by migrant status. It also addresses the third priority area of the Newton-Katip Çelebi Fund, namely Disaster and Risk Management, tying into the Risk Management component and addressing societal risks associated with accepting a large number of refugees.

Additionality

Evidence from the case study points to the additionality of the Newton Fund in supporting this project. The idea for the project emerged through the Newton Fund. The Turkish project team was initially exposed to the Advanced Fellowship opportunity thanks to a workshop on another unrelated Newton Fund-supported project, which took place at the University of Kent. The workshop in Kent included both UK and Turkish researchers. This exposure triggered the project team's interest, who investigated the availability of further opportunities awarded by the Newton Fund and decided to prepare an application as a result. It should be noted that the UK and Turkish AHs already knew each other from earlier work as part of the Turkish AH's PhD and already had a strong working relationship. This Fellowship granted them the opportunity for additional collaboration.

5.2 Effectiveness of Newton Fund activities

Capacity building effects

The case study found evidence of substantial capacity improvement at both the individual researcher level and at the institutional level, especially among Turkish partner institutions. Members of the Turkey-based project team reportedly gained a good understanding of the qualitative analysis software NVivo thanks to a dedicated one-day training received during their visit to the University of Birmingham. More broadly, team members learned from UK methodological expertise in applying qualitative studies to analyse migration and refugee issues. Multiple team members stated that their understanding of qualitative research methods and the ability to apply them in practice had significantly improved thanks to this project, especially in terms of conducting comparative analyses and investigating narratives surrounding local government responses.

The individual benefit to particular researchers has also translated to a **broader improvement in institutional capacity to carry out further research.** For example, a Turkish team member has been able to forge important connections by conducting fieldwork and other project activity with municipal government officials, migration-oriented NGO and INGO staff or other relevant stakeholders active in the migration and refugee sector. These relationships proved instrumental in creating synergies between influential local stakeholders and the recently established Centre for Migration and Development Research at her institution. This creates a potential channel to disseminate and encourage uptake of further research in the refugee sector and indicates an interest among the local community and local government in implementing lessons learned from new research.

Due to financial limitations and teaching responsibilities, it is typically difficult for academics in Turkey to expand and sustain their international networks. **The project has enabled Turkish academics to identify UK research partners and set up sustainable research networks at the national and international level.**

The project has led to joint participation in international conferences, workshops, and seminars for the project team. This has raised the profile of the research and its team. So far, this has included departmental seminars, international migration conferences, and capacity building events for younger people and academics both in the UK and Turkey, as well as in other countries. More specifically, emerging research findings were presented in five conferences and international workshops in the UK, Turkey and abroad.[44] The project has also set up a website to document its progress and further disseminate results, as set out in the proposal.[45]

Benefits for UK partners

The strategic importance of creating and maintaining international collaborations, in terms of forging security links and developing soft power, were cited as secondary benefits from any collaboration with Turkey. There have been benefits to the UK partner institution, particularly through the formalisation of links between the University of Birmingham and Işik University. Direct impact on knowledge creation and dissemination is also expected by translating a planned policy brief into English, which can then be publicised in UK networks. Researchers at the University of Birmingham have good links to policymakers working on migration issues, and there is potential for some of the findings to serve as an additional base from which to frame policy discourses. **The modest budget for the project makes any potential impact on UK research or policy practice minimal.**

Turkey is seen as having a very mature academic practice and traditionally strong links with the UK. There are a large number of Turkish PhD students in the UK, and bilateral research opportunities may facilitate continued access to Turkish academic excellence. The UK AH also had the opportunity to meet some renowned professors in Istanbul as part of the project visits, which further strengthened research networks and the potential for further partnerships. The Newton Fund has provided intellectual and academic support to UK researchers interested in bilateral collaborations and providing renewed thrust for collaboration.

5.3 Emerging signs of impact

A broad outcome of the project has been its contribution to shifting the focus of research on refugees from central to local government level. This feature of project design has proved important, as there are high levels of interest among international donors in funding refugee-related research in Turkey and an increasing number of INGOs are engaged at the local level in refugee responses. The project's focus on local government responses is supporting policy research that feeds directly into this group's needs. Once completed, it has the potential to influence policy responses at the local level.

The Newton Fund projects are able to change the trajectory of researchers' careers and establish novel research streams of direct relevance to social issues at the local, national and international level. For example, the Turkish PI was motivated by the project to

[44] Turkish and UK research partners shared research findings at four conferences/ international workshops: i) 'The framing of the 'migration crisis' cross-nationally: From problem definition to institutionalisation (or not) – Boğaziçi University, Istanbul (2018); ii) 'Mixed Migration Flows and the Changing Dynamics of Migration Research' – Şehir University, Istanbul (2018); iii) 'Understanding International Migration in the 21st Century: Conceptual and Methodological Approaches – 16th Annual IMISCOE Conference; Malmo, Sweden (June 2019), iv) 'Unpacking the Challenges and Possibilities for Migration Governance'- University of Cambridge (2019).
[45] Local government and refugees, 'Syrian refugees in Turkey : understanding local government responses' Available at: https://localgovernmentandrefugees.rabiakarakayapolat.com/

give up the head of department position at her university after ten years and focus solely on research.

Analysis and reporting of local government responses in the Adana region are still ongoing, and comparative analysis with Istanbul districts had yet to be carried out at the time of writing. **It is therefore too early to report actual impact for the project, as data analysis is still ongoing.** If effective policy responses are highlighted and taken up by other municipalities, this could increase the welfare and overall well-being of a higher number of refugees and contribute to the broader poverty reduction agenda and the aim to 'leave no-one behind'.

The project shows potential for improving refugees' welfare and treatment in Turkey based on responses from authorities and organisations involved with refugees. In contrast to the prevailing opinion that most policy responses in Turkey are centralised, research has found that local governments across the country are very active in assisting refugees, and they use various approaches according to refugee demands in their area. As a result, there is a lot of appetite for evidence-based research on best practices in accommodating refugees at the local level and embedding research into local policy responses.

Once complete, the research generated by this project has the potential to be taken up by local policymakers not only in Adana or Istanbul but potentially in other refugee affected areas as well. Although the research is still ongoing, the project team has already established links with local governments and local associations in Turkey. The project hosted a successful launch event with approximately 50 attendees from NGOs and government agencies, which has raised awareness of their work. Continued participation in conferences and seminars and disseminating findings through the project website and blog will help increase research visibility and disseminate results to both the academic and policy communities and a wider audience.

The project has strengthened the UK's position as the leader in implementing rigorous qualitative studies in migration and policy response narratives. Workshops carried out in the UK during the in-country visits were effective in showcasing UK expertise in this field. This study has encouraged other members of the Turkish team to explore research collaboration opportunities with the UK. The Fund's model, its flexibility, and the ease with which the project was implemented were cited as incentives for other researchers to consider the Newton Fund and could also encourage them to work with the UK on other projects.

Signs of sustainability

Since the design and application process, the project has exhibited signs of sustainability. From the outset, the project aimed to disseminate findings on comparative policy discourses via workshops and conferences targeting policymakers, local government officials and interested NGO personnel (including those to be interviewed during fieldwork). So far, at least one dissemination event had taken place during the UK team's visit to Turkey, when research findings were presented to an open forum of academics from several universities collaborating with the Turkish AH's institution. Dissemination through open events has been paused due to the COVID-19 pandemic.

The project has supported new links between research institutions and local government and NGO representatives in the Adana region. Fieldwork and interviews carried out with stakeholders have helped to create a network of individuals and institutions interested in research outputs on refugee policies at the local level. Contingent on available funding, this could lead to follow-up research by the project team or new research projects and

could potentially result in evidence-based policymaking or at least visibility among local-level decision-makers.

The knowledge generated during the project will be disseminated to students at Çukurova University, where the Turkish PI will be a guest lecturer. There are plans to hold two guest lectures in the autumn semester of 2020, where students would be exposed to the data sets collected by the researchers, the main research findings and would be able to discuss refugee-related issues through the prism of local government responses. It is also expected that the Turkish PI will include the main findings of the research in the coursework at her own institution. Knowledge dissemination will inform the next generation of refugee and migration researchers about the most recent trends in Turkey.

Complementarity and coordination

In response to interest from municipalities, researchers wish to establish an organisation called Marmara Municipalities Union to bring together more than 200 municipalities, including some in the Istanbul region. The intention behind this union is that if any research on the topic is published, all associated municipalities would have access to it. According to the research team, it is particularly important to establish local networks of this kind, as there is more scope for participatory (or bottom-up) policymaking at the local level. Working with these stakeholders could boost the impact of the project.

Once research papers are published, the project team is planning to write a short piece on its website to disseminate the findings to the general public. Academics are also planning on writing short pieces about their work in the two languages.

5.4 Conclusions

- **As a People Pillar initiative, the Newton Advanced Fellowship built the Turkish research team's capacity and improved their skills in qualitative methods**. This was done through training workshops and seminars at the University of Birmingham. Following training and capacity building, researchers then went back to Turkey to cascade learning to others and conduct the planned fieldwork more effectively.
- **The second key component of this project was the collaborative research itself, which aims to analyse local government responses to Turkey's refugee crisis and explain variation between different localities in the country**. This results in a substantial overlap with Research Pillar activities and objectives. The research investigates how local governments address refugees' needs, especially Syrian refugees who are not granted official refugee status but are treated as 'guests'.
- **There is evidence of capacity improvement both at the individual researcher level and at the institutional level among Turkish partner institutions, especially in their knowledge of qualitative research methods and the use of NVivo software.** The benefits observed among individual researchers have also translated into broader institutional capacity improvement by linking researchers' institutions to local NGOs, INGOs and municipal government networks involved in refugee-oriented research.
- **The research led to a paper in the publishing pipeline at the Journal of Local Government Studies.** Research findings have also already been presented at four international conferences or workshops. It has strengthened and formalised links between the University of Birmingham and Işik University and is seen as having provided intellectual and academic support to researchers interested in bilateral collaborations.

- **The project has contributed to the UK's position as a leader in implementing rigorous qualitative studies in migration and policy response narratives**. Researchers in the UK have also benefited from increased access to local knowledge and research networks and original field research on refugee policies at the local level in Turkey.

Lessons learned and points to consider going forward

- **The project has shown that there is an appetite for evidence-based research on best practices in refugee policy at the local level and potential opportunities to embed research into local policy responses.** Once the research is completed, it has the potential to feed into local-level policy responses, provided that dissemination events and materials are widely distributed and impactful.
- **Pre-existing personal or informal links between researchers are an important factor in project success.** The UK and Turkish AHs knew each other from earlier work on the Turkish AH's PhD and already had a strong working relationship. The Turkish team members also had professional links going back decades, which enabled very smooth project implementation. While formalising these links and adding an institutional dimension to them is seen as an important added value, these pre-existing links seem nonetheless to be a key supporting factor for successful collaborations in the People Pillar.

6 Project: Innovating the Turkish supply chain for services in humanitarian aid

Summary

Project title	Innovating the Turkish supply chain for services in humanitarian aid
Call title	RCUK-TUBITAK Research Partnership Call
Short description	The project examined two issues related to refugees in Turkey, in particular Syrian refugees: 1) the provision of health and education services to refugees, and 2) cash distribution as aid to refugees. The project developed computerised models for the most efficient distribution of cash cards and the most effective means of providing education and healthcare services to refugees living in camps or communities concentrated around camps. Using algorithms and tools from the discipline of operational research, the project looked at these issues from the perspective of mathematical optimisation.
Objective(s)	The objectives of the project were to: • maximise reach of services and minimise resources used when disbursing cash cards and providing education and healthcare services to refugees. • develop guidelines for setting up the supply chain for the distribution of cash, as well as education and healthcare services.
Pillar	Research
Action value (total budget allocated in country, in GBP)	£190,370.49 (UK funding) Turkey funding
Start/end date (Status: on-going or complete)	Status: Completed Start date:01/09/2016 End date: 31/05/2019
DP UK and overseas	UKRI (UK) and the Scientific and Technological Research Council of Turkey – TÜBİTAK (Turkey)

Award holders/ grantees	Nottingham Trent University (UK) Koç University (Turkey)

Description of the project

The project was funded as part of the Research Partnerships Call between RCUK (now UKRI) and TÜBİTAK. It focused on studying and improving the logistics and planning processes of various humanitarian operations related to the Syrian refugee crisis. Nottingham Trent University was the lead research organisation in this project. It worked closely with Koç University in Turkey and agencies working in disaster and refugee response in the country. The project aims to generate research to improve service provision to refugees, including in education and health, and develop guidelines for cash distribution in the humanitarian supply chain.

At the time of writing, there were approximately 3.6 million Syrian refugees in Turkey. Some of them receive social assistance in the form of direct cash subsidies, delivered through so-called cash cards, which can be used similarly to ATM cards or to pay for goods in specific service providers in designated locations. These cash cards are only distributed to eligible families, yet the exact number of the cards distributed is unknown, as this is confidential information and exclusive to the central government in Turkey. The distribution of cash to eligible families, and the setting up a system of dedicated service providers who accept the cards (or cash stored in them), naturally has cost and logistical implications. By investigating this issue, the project sought to maximise the number of people (refugees) that can be reached with services accepting cash card payments and to minimise the cost of setting up the system.

The parameters used in the computerised model were the locations of the facilities accepting card payments, such as grocery stores and other locations. The researchers aimed to identify the 'optimal' points to set up temporary facilities that would also accept card payments. Finally, the model sought to specify which mobile service points should reach demand points and in which order and the routes that vehicles used in mobile service provision should take to maximise reach and minimise fuel costs. An integrated computerised model was developed to provide these data points for use by service providers.

Algorithms created in the project can be applied beyond service provision among refugees, such as distributing vaccinations, providing reproductive health examinations and screenings, and providing educational services such as Turkish language classes or pre-school activities.

The project was split into three phases. The first phase aimed to analyse the current refugee situation in Turkey. The team conducted interviews with agencies specialising in the refugee crisis and disasters in Turkey and performed desk research to enrich their knowledge on the subject areas. The second phase focused on developing and applying operational research models to identify where and how to locate the necessary services to enable optimal support to beneficiaries. The final phase aimed to integrate the team's findings on two sub-projects (cash and voucher distribution and health and educational services) and test the developed models in the Turkish setting. The team developed a framework for monitoring, measuring, and assessing the impact of their findings on stakeholders.

Pathway to impact

As shown in Figure 8, Annex 4, the project's Impact Logic is as follows:

- **Activities:** In the first stage, the current situation of refugees was analysed through fieldwork, including interviews with specialist agencies and desk research. The second stage developed mathematical models and solution methods. These were applied to a case study and modelled to determine where and how to locate the service facilities to provide optimal support and reach the beneficiaries. This also included developing a decision-making methodology and decision-supporting recommendations for site selection of refugee camps and mobile public services. In the third stage, the team aimed to integrate findings and test the models in the Turkish context. Throughout the study, various international workshops, seminars, and conferences were held to discuss findings, plans, and progress, and share knowledge and build capacity.

- **Expected outputs:** This project aimed to support the design and provision of two main services: electronic card distribution and access to public services, such as education and healthcare. This includes the design of cash and voucher supply chains, development of guidelines, tools and a decision-making methodology for the set-up of cash and voucher distributions, and the selection of refugee camps for implementing the model. The collaboration developed a programming model and an heuristic algorithm.[46] The team also sought to publish various articles and reports stemming from their research and findings in international journals, as well as a data set including coordinates and population information in areas surrounding potential service points and main locations where refugees live.

- **Expected outcomes:** The project's main goal was to identify and implement improvements to the supply chain for cash and voucher distribution (which would replace distributing core relief items) and for the provision of health and educational services. The electronic key card distribution network design aims to reach the most beneficiaries possible within a certain time frame and at minimal logistical cost. For example, through the design of cash and voucher supply chains, the team hoped to develop guidelines and tools on how to set up distribution points to reduce travel and waiting times while still guaranteeing sufficient security. Through its decision-making methodology and tools for site selection of refugee camps, integrated with the routing of mobile public services, the research collaboration aims to create a system where camps can be provided with the necessary inputs to allow services to reach beneficiaries in the shortest possible amount of time.

- **Expected impact:** Improving healthcare and education services, and the development of a cash voucher system, support livelihoods and stimulate the market economy. Cash and voucher distribution systems can give refugees and other beneficiaries more flexibility in terms of spending decisions and can also support particular development targets (such as through cash transfers conditional on the education of children and adolescents). The tools, guidelines, and methodology this project aims to develop can help humanitarian organisations make better strategic, tactical, and operational level decisions and identify cash distribution points that minimise refugee travel times and maximise security. The tools can also assist in the scale-up, monitoring, and impact assessment of cash and voucher distributions. Through their work, the team also aims to improve governmental decision-making speed and quality in regard to the distribution of services in response to the refugee crisis. The research team also expects to see an increase in jobs among local vendors who would benefit from the distribution of cash and vouchers.

[46] A heuristic algorithm is one that is designed to solve a problem in a faster and more efficient fashion than traditional methods by sacrificing optimality, accuracy, precision, or completeness for speed. Available at: https://optimization.mccormick.northwestern.edu/index.php/Heuristic_algorithms#:~:text=A%20heuristic%20algorithm%20is%20one,a%20class%20of%20decision%20problems.

6.1 Emerging project results

Relevance of Newton Fund activities

Activity targeting and ODA relevance

Currently, the Middle East and North Africa are the regions most affected by man-made disasters, with ongoing conflicts in Yemen, Libya, Syria, and Iraq. Since 2011**, over 5 million people have left Syria to seek refuge in neighbouring countries,** with 3.6 million currently living in Turkey. The influx of Syrian refugees has made Turkey the country host to the greatest number of refugees in the world.[47] Forecasts show that over the next 50 years, natural and man-made disasters will only continue to increase – it is estimated up to five times, in terms of likely impact and number. This highlights the need for humanitarian organisations to improve their decision-making capabilities and the effectiveness and efficiency of their humanitarian response approaches.[48]

The humanitarian sector has typically provided material assistance to beneficiaries during disaster relief. More recently, there has been recognition of the importance of support services such as health and education and the potential to replace the direct distribution of relief items with cash and vouchers. This can benefit local markets and support livelihoods. Due to its focus on the refugee crisis response, the project has direct relevance to tackling the pressing socio-economic issue posed by the large number of Syrian refugees in Turkey. Further relevance could be facilitated if the researchers were encouraged to take their models to market and test them in real-life situations. As further explained in the sections below, the team face some barriers to raising interest on the part of government agencies for the research models and improved practices.

Additionality

The scale and scope of the project would not have been possible without Newton Fund support, primarily because the Fund enabled the hiring of research assistants and people key to the research work (analysis and algorithm construction). The Newton Fund also made it possible to have a project of this size and allowed the research team to finalise the construction of the logistical models. Newton funding also enabled the team to regularly hold meetings and research visits and follow up on project progress.

UK and Turkish teams had not previously collaborated nor were known to each other. Although the Turkish team already had the research topic in mind, they did not have any existing links to the UK or any previous instances of collaboration. One of the Turkish researchers was introduced to the UK AH through a mutual friend. This proved to be a fruitful collaboration, as the Turkish and UK teams had complementary research interests well-suited to a research partnership. **Both sides described the Newton Fund as having the 'right' kind of approach to facilitate cooperation and joint project work by facilitating frequent interaction and exchange.**

6.2 Effectiveness of Newton Fund activities

Research outputs on topics relevant to economic development and poverty reduction

[47] Allahi et al., (2019)
[48] Allahi et al., (2018)

The project was a successful research collaboration between Turkish and UK institutions. It has resulted in the development of a new logistical optimisation model, applied to an innovative research area in operations research. Both sides of the partnership highlighted the quality of the research collaboration. Each partner praised the other's technical ability, the speed at which research was carried out, and appreciated the opportunity to work on an interesting and innovative dataset. The planned optimisation models were developed for both research areas (cash and vouchers and education and health services) and have already undergone a formal TÜBİTAK review process.

The findings of the models themselves are relevant to socio-economic well-being. The first model was developed after a visit to the International Organisation for Migration (IOM) agency in Gaziantep. Here, the research team found that cash-based initiatives may not always be a good solution and sometimes may not be possible to achieve, such as in cross-border situations without adequate access to partners for cash distribution. For this reason, the team created an optimisation model that could help trade-off costs and timeliness while providing end beneficiaries with more choice. The research team also looked at refugee populations in towns to estimate the likely demand for cash cards. The size of the dataset was very large, and the team developed special methods to handle the data, including new algorithms.

The second optimisation problem investigated by the project was the provision of healthcare or educational services in refugee camps in Turkey. More specifically, the project aimed to identify the optimal time and day of the week for service provision and the order in which they should be provided to different camps. A specialised method was developed to tackle this problem, called a 'branch and price' method. As these services were rolled out across 15 to16 refugee camps, the research team generated data and defined model parameters based on their geographic location. The working assumption of the model was that education and healthcare services would be provided in government buildings. Including those buildings' locations using Geographic Information System (GIS) software enabled the team to operationalise the model using real-life distances.

Following the development of these models, the two algorithms were developed and tested using the Cplex mathematical optimisation software rather than real-life testing due to low interest and limited engagement from government agencies. In the testing phase, the team imagined how services might be distributed in practice and assessed how their provision could be optimised. The team also developed a system dynamics model to understand the effect of cash-based initiatives (CBI) on end beneficiaries' dignity.

Research outputs are in the process of being produced, with a slight delay due to the impact of the COVID-19 pandemic on data collection. Despite the delay, two papers have already been published,[49] and the dataset produced by the project has been released. The data set has already been used in a humanitarian operations project, though little information is available on emerging results. The dataset includes GIS coordinates and population information for potential service points and the main locations where refugees live in the Kilis province of southern Turkey.

Benefits to UK partners stem from the fact that timely and interesting datasets can now be accessed to construct optimisation models. UK researchers were also able to draw on their Turkish counterparts' technical ability, who brought expertise in constructing state-of-the-art optimisation models.

[49] Allahi et al., (2019); Allahi et al., (2018).

6.3 Emerging signs of impact

Practical impact of the project would be seen through the uptake of the new optimisation models to the planning and distribution of humanitarian operations related to the Syrian (or other) refugee crises. **There would need to be involvement from government or international agencies leading disaster response activities for on the ground change to happen**. For the moment, this has not been observed in this project, except for the application of the dataset by one humanitarian response project. The project team has disseminated the work through academic conferences, but engagement with government has been limited to date. **Further impact on refugee and disaster-affected populations will depend on dissemination activities and engagement with the relevant agencies.**

In terms of the partnership between the UK and Turkey, this collaboration – the first between the two partners – has strengthened the relationship between research teams and the institutions more broadly. **The research team is continuing to seek opportunities to collaborate and is preparing a new project proposal for European Union funding to carry out additional research in this field.** There are ideas to develop similar models that can be applied to optimise vaccine distribution for potential application in the distribution of a COVID-19 vaccine.

Signs of sustainability

Sustainability measures could have been factored into the call and project design. There was no explicit incentive for the research team to consider further dissemination of the research in their project plans, to plan to develop the models beyond prototype stage, or engage with potential implementing partners who could help translate research into improved service delivery. A specific research uptake component in the project's design could have helped ensure further thinking around engagement with the authorities and on the ground change.

There is potential for the models and methodologies developed in this research collaboration to be applied in real-life scenarios. However, to do so, **the work must reach key decision-makers** whose interest has proved limited so far. For example, the team could not speak with government agencies responsible for card distribution among refugee populations, who have not received any insights from the research. Although the research has already resulted in publications, further explicit efforts will be needed to ensure that these reach the right policymakers.

The research team has identified a need for further research on the appropriate conditions to run successful cash-based initiatives and quantify their impact. Additional research in this field – though not currently planned – could help further improve service provision in future.

Complementarity and coordination

The research team has worked with several organisations to assess and understand supply chain elements of cash-based initiatives, such as the Fritz Institute in the US. Turkish partners also continue working with the UN Refugee Agency (UNHCR) on CBI projects. Some have plans to further engage with the IOM on supply chain assessments going forward, applying the findings from this project. As there is little academic work being done in this domain, it is hoped that these initial collaborations could raise awareness and inspire the academic community to investigate further.

6.4 Conclusions

- The project focused on the logistics of humanitarian operations related to the Syrian refugee crisis. It developed optimisation models for the replacement of aid supplies with money or coupons, and for the provision of health and education services. The collaboration developed mathematical models to determine where to place service facilities and how best to reach the beneficiaries to provide the most effective and efficient level of support to refugees. **If taken to market, this solution could contribute to improved emergency response planning and better delivery of goods and services to refugees.**
- The electronic card distribution network aimed to reach the most beneficiaries within a certain period and minimise logistical costs. The research resulted in a decision-making methodology and decision-supporting tool. A programming model and an effective heuristic algorithm were also developed. **With this methodology's help, the selected campsites can be provided with the necessary support for services to reach beneficiaries in the shortest possible time**.
- **The research collaboration was innovative in its introduction of a new area of focus to the field of refugee operations research.**
- **Research findings could potentially be applied to the distribution of COVID-19 vaccines or other emergency relief items**, something the research team is interested in pursuing.
- **The project strengthened the research networks among participating researchers.** The research team is developing new project proposals to seek EU funding.

Lessons learned

- **Project calls and proposals should be designed with testing, market uptake and engagement in mind** – and should have sufficient allocated funds to do so. While research findings from this collaboration are innovative and useful, researchers do not appear to have been incentivised to scope out government decision-makers' potential appetite to implement this solution in practice. During the proposal stage, a research uptake requirement could have included more active outreach to potential users of the solution, requiring researchers to think about uptake strategies and potential testing as part of the research activities. As it stands, the project ended as an experimental research piece with no immediate plans to test whether it has any potential to be applied in practice.
- There is an appetite for implementing this kind of model by international and national NGOs servicing refugee camps. **They could potentially have the means and facilities to test whether this type of model will work in practice.**
- An important lesson learned from this project is **that refugee-oriented research and its potential uptake can be thought of through the lens of non-governmental actors, rather than purely in terms of bilateral, governmental or academic ones.**

Annex 1 – Methodology

Research methods and data collection approach

The country case studies are central to our Final Evaluation approach and involved an intensive period of remote research by the evaluation team members.

Preparation for the research included a document review of country-specific documents on Turkey's research and development context. Documents reviewed include the evaluation's Turkey End line Report and the updated Country Situation Note. We also conducted a literature review of additional documentation on Turkey's science and innovation landscape, and existing UK-Turkey collaboration activities. Project-specific documentation, such as application forms, progress, and final reports, were reviewed for each action included in the study, where provided by the Delivery Partner, local partners or researchers.

The document review was accompanied by **remote research with respondents in Turkey and the UK** in September – October 2020. Three main categories of stakeholders were interviewed: i) in-country UK representatives and Newton Fund in-country team; ii) UK and local funders; and iii) participating researchers. In some cases, additional university staff, such as university leadership or other research teams, were also interviewed.

Our data collection was complemented by an analysis of the pathway to impact for each action, which can be found in Annex 4. Here, we analysed each project's trajectory to impact by placing it within the Newton Fund Theory of Change. This allowed us to visually represent the pathway to outputs, outcomes and impact of each activity, and highlight its (potential) contribution to broader Newton Fund goals.

Limitations of the research approach

The short timeframe for country case study research meant that we could only include **three projects within our case study.** These are not representative of all Newton Fund activities as a whole. The short timeframe also limited the number of stakeholders we were able to interview in Turkey. The volume of documentation provided varied by project, thus limiting the possibility of triangulating findings. The case study findings reflect the data provided by each project and what is available online.

Research findings have been triangulated across different stakeholder groups and various sources of documentation (project documents and online resources such as the RCUK Gateway to Research portal). However, the research team could not independently verify statements by all the different contributing stakeholders or verify what was reported in the documentation.

Specific to the Turkey case study for the Interdisciplinary Research Links for Medical AI project, it was unfortunately not possible to interview the UK PI, which has limited our ability to discuss results for the UK side of the collaboration. Additionally, the COVID-19 pandemic has resulted in the need to revisit our data collection approach, particularly in terms of our 11 country case studies. The case study research was originally scheduled to take place in three waves of partner country visits between March and August 2020. The inability to travel internationally and the closure of offices, embassies, universities and research centres required switching to a **remote-based approach**, as agreed with BEIS in March 2020.

In revising our case study approach, we recognised that switching to a remote-based approach would likely have implications on the quality of data collected, as outlined in our April 2020 Concept Note. The quality of interviews could have been affected for several reasons, including:

- problems with connectivity, technical issues and limited telephone or internet coverage, which posed the risk of lowering the quality of calls and cause loss of rapport, creating abrupt feelings in interviews and affecting the depth and quality of our findings.
- the absence of visual or nonverbal cues, inability to observe behaviour and body language, with the risk of telephone interviews becoming mechanical and cold.
- having little opportunity to establish rapport with respondents and having potentially shorter times for interviews as respondents may more easily become fatigued by telephone compared to face-to-face interaction.
- limited engagement, low response rates and little interest in participating in our research, which might limit the breadth and depth of our findings.
- the inability to visit laboratories or facilities, and limited scope for unplanned interviews with additional staff members, researchers, or others in the same institution.
- fewer opportunities for check-ins and informal conversations with in-country teams (ICTs), who are a rich source of data.

We mitigated these issues in several ways, where:

- we included additional time for document review prior to interviews so that conversations moved on to speaking about results, emerging impact, and challenges (to take into account for shorter interview times and potentially lower quality interviews). However, it is important to consider that availability and quality of project data and information varied considerably across sampled interventions.
- we favoured video interviews wherever possible to limit the lack of nonverbal cues and to help establish rapport with respondents.
- we had several email exchanges prior to interviews to create an initial connection and rapport with participants, and to set out the objectives and areas covered in the interviews by sharing topic guides prior to our calls.
- we organised follow-up interviews wherever possible to fill any remaining information gaps brought about by having shorter interview times. We also gathered interviewee insights on additional respondents and carried out additional interviews which emerged from email exchanges and interviews.
- we organised regular check-ins with ICTs via email or telephone and delivered online presentations and validation sessions with each ICT to share emerging findings after having carried out all interviews. This allowed us to ensure we had accurately reflected the Newton Fund's experience in each country.

Annex 2 – Case Studies Sampling Overview

This Annex summarises the sampling approach used for the country case studies which inform the Final Evaluation of the Newton Fund. Detail on the approach and criteria used to develop the sample for the case studies is annexed to Tetra Tech's Newton Fund Final Evaluation Report.

Final evaluation country sample

A total sample of 11 countries with three calls per country (totalling 33 calls) was agreed with the Department of Business, Energy, Innovation and Science (BEIS).

The countries selected for the country sample were China, Malaysia, Chile, Turkey, South Africa, Brazil, India, Philippines, Jordan, Peru and Kenya. The sample includes three additional countries (Jordan, Kenya and Peru)[50] due to the Newton Fund's expanded scope. Six of these countries were included in the Mid-Term Evaluation (MTE)[51] of the Newton Fund case study research.[52]

The criteria used for the country selection were:

- coverage of all regions covered by the Newton Fund.
- coverage of different levels of existing innovation and capacity of partner countries (as defined by the 2015 Global Innovation Index rankings and BEIS' initial assessment of capacity).
- learning opportunities from new ways of working regionally in countries that either graduated from the DAC list or have ODA sensitivities; or operating in/ recovering from crises.
- the inclusion of Peru, Jordan, Kenya (countries that have not been explicitly included in the evaluation scope until now).

Non-selection of countries (or calls) does not reflect significance, quality or importance.

Proposed sample of calls and projects

Data from BEIS' Newton Fund Activity Tracker (January 2020)[53] enabled the evaluation to determine 'call' activity and identify three 'calls' per country, giving a total of 33 calls in the sample. The following criteria were used to develop the call sample:

- ensuring coverage of all DPs.

[50] Jordan, Kenya and Peru were not included in the MTE data collection, as they had just joined the Newton Fund. BEIS agreed to carry out in-depth case studies in the 3 new countries to ensure coverage of activities there.
[51] Tetra Tech (2018) Mid-Term Evaluation of Newton Fund. Available at: https://www.newton-gcrf.org/resources/
[52] These were: China, Malaysia, South Africa, Brazil, India and the Philippines. Mexico and Egypt, which were part of our MTE sample, have been replaced with Turkey and Chile respectively to increase opportunity for learning.
[53] The BEIS 'Activity Tracker' is an Excel-based internal monitoring tool by BEIS and updated quarterly by the UK Delivery Partners.

- ensuring coverage of the three different pillars.
- reflecting emphasis on spending/thematic priorities in each country.
- allowing for longitudinal analysis by including six projects analysed as part of the MTE.

The outcome of the call sampling approach allowed for the identification of specific projects under each selected call. This was achieved in consultation with DPs, BEIS ODA Research and Innovation and ICTs.

The project sample allows for coverage of all DPs and pillars within the Newton Fund portfolio. Six projects were analysed as part of the MTE and again at Final Evaluation to allow for longitudinal analysis. The sample list of 33 calls and projects is annexed to Tetra Tech's Newton Fund Final Evaluation Report.

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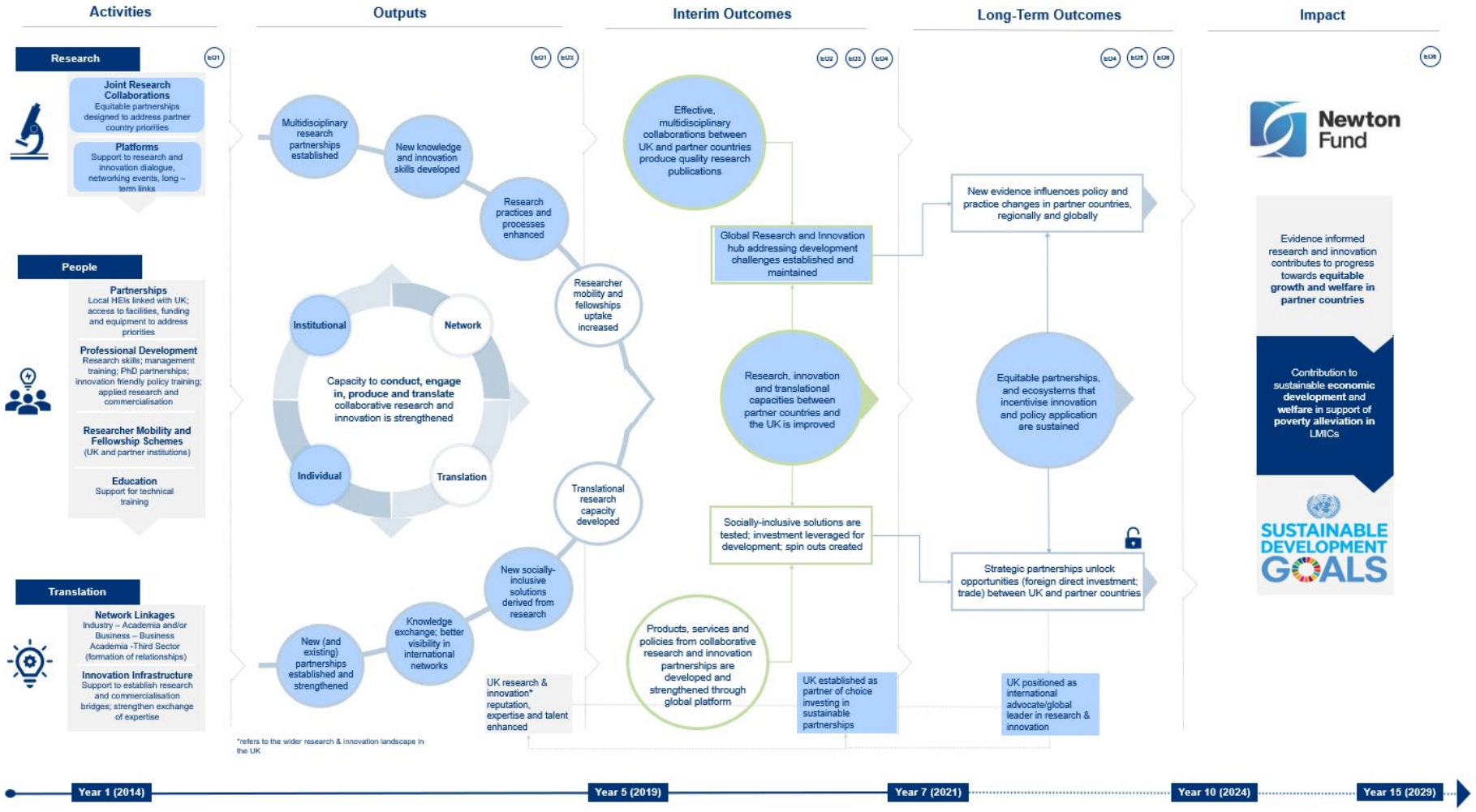
- Erhan Yavas, Newton-Katip Çelebi Fund Programme Coordinator, Education and Society, British Council, Ankara, Turkey
- Prof. Rabia Karakaya Polat, Newton Advanced Fellow, Department of International Relations, Işik University
- Vivien Lowndes, Professor of Public Policy, Institute of Local Government Studies, University of Birmingham
- Peris Thuo, Research Funding Manager, British Academy, UK
- Barbaros Yet, Assistant Professor, Hacettepe University
- Laura Bones, Senior International Policy Manager – Newton Fund, UKRI
- Roshni Abedin, Senior International Policy Manager, GCRF, UKRI
- Sibel Salman, Professor, Industrial Engineering, Koç University, Turkey
- Sander de Leeuw, Professor, Nottingham Business School, UK
- Bora Kat, Researcher, TÜBİTAK
- Asli Ilgit, Chair, International Relations Department, Çukurova University, Turkey

Annex 4 – Theories of Change per Action[54]

Figure 6: Pathway to Impact – Interdisciplinary Research Links for Medical AI: Management of Musculoskeletal Injury



[54] The figures present the pathways to impact for the three projects reviewed in this case study, set within the overall Newton Fund theory of change. Specific pathways to impact for each project are indicated by the blue shaded shapes in each figure.

Figure 7: Pathway to Impact – Syrian Refugees in Turkey: Understanding Local Government Responses

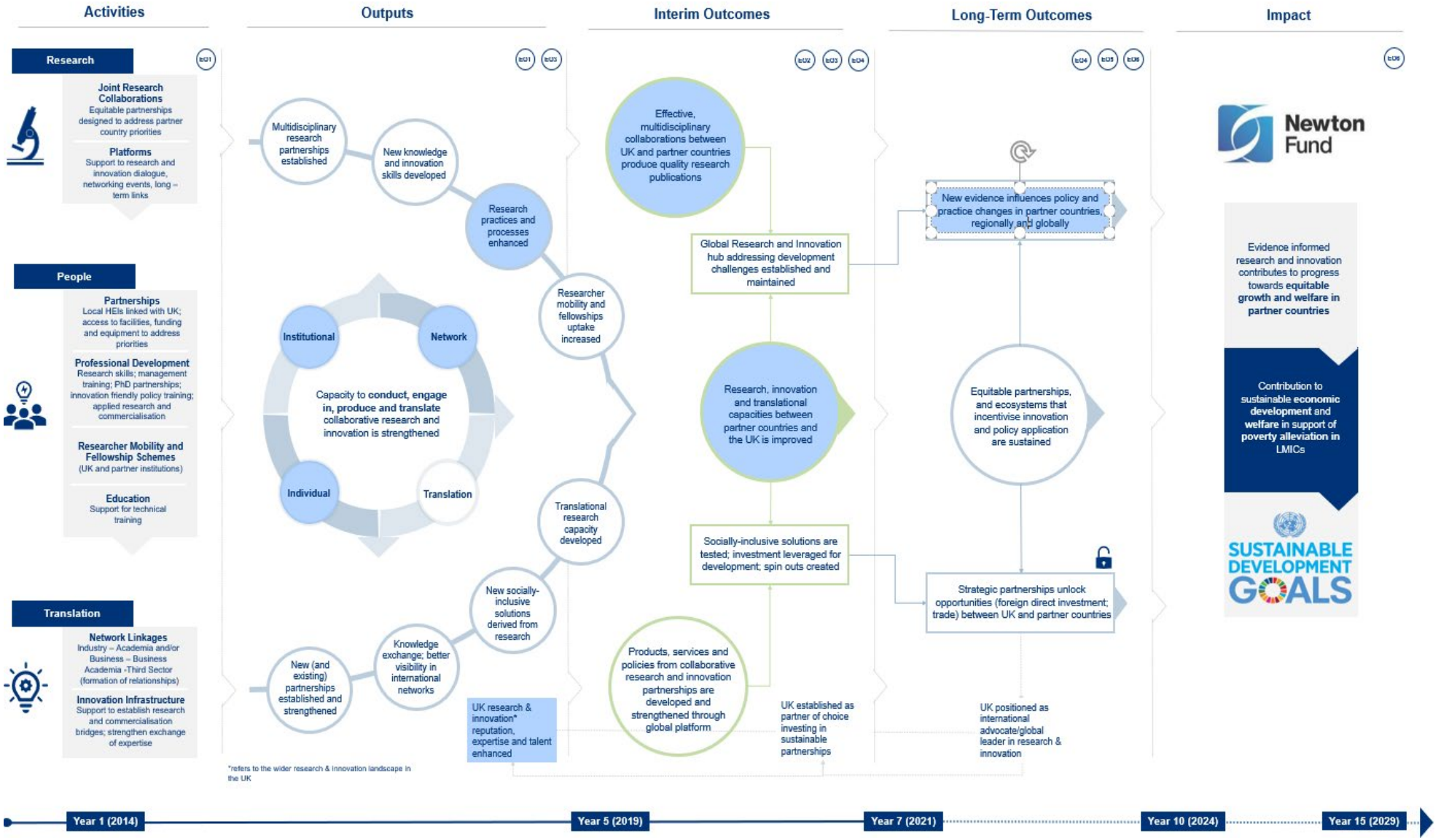
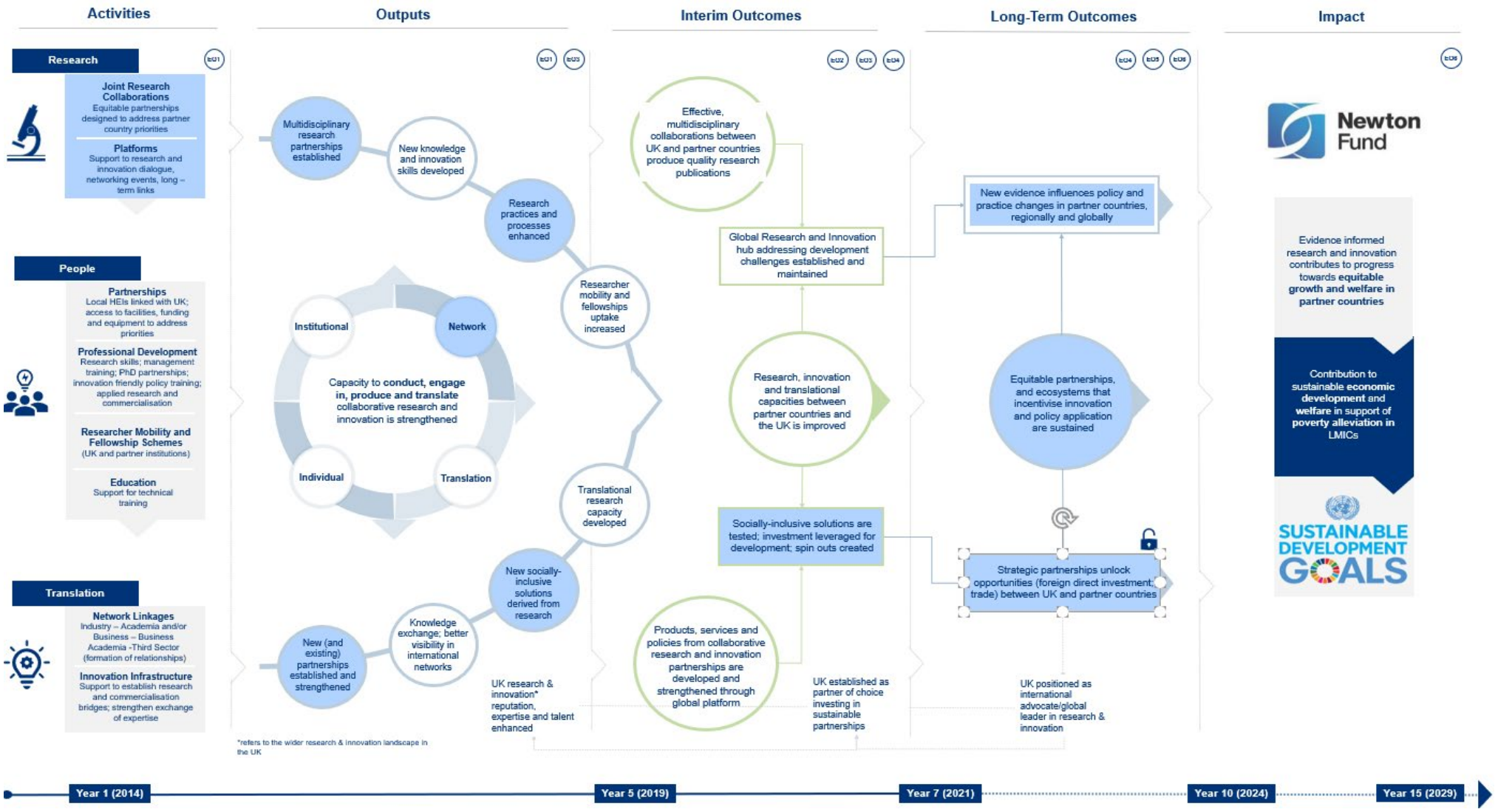


Figure 8: Pathway to impact – Innovating the Turkish supply chain for services in humanitarian aid



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