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IMPLEMENTATION COMPLETION AND RESULTS REPORT

TF073258

ON A

SMALL GRANT

IN THE AMOUNT OF USD1.1 MILLION

TO THE

Ministry of Economy and Sustainable Development

FOR

Technology Transfer Pilot Project (P169599)

{Date}

Finance, Competitiveness And Innovation Global Practice
Europe And Central Asia Region

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ABBREVIATIONS AND ACRONYMS

| | |
|-------|---|
| DA | Designated Account |
| GENIE | Georgian National Innovation Ecosystem |
| GICI | Georgia Institutional Capacity for Innovation |
| GITA | Georgia Innovation and Technology Agency |
| HPMSM | High purity manganese sulfate monohydrate |
| IP | Intellectual Property |
| Mn | Manganese |
| MSMEs | Micro, small, and medium enterprises |
| NDA | Non-disclosure agreements |
| NGOs | Non-Governmental Organizations |
| NMC | Nickel, Manganese, Cobalt |
| PDO | Project Development Objective |
| R&D | Research & Development |
| RDIs | Research and development |
| RE | Recipient-Executed Trust Fund |
| TT | Technology Transfer |
| TTO | Technology Transfer Office |
| TTPP | Technology Transfer Pilot Project |
| WBG | World Bank Group |

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DATA SHEET

BASIC INFORMATION

Product Information

| | |
|----------------------|-----------------------------------|
| Project ID | Project Name |
| P169599 | Technology Transfer Pilot Project |
| Country | Financing Instrument |
| Georgia | Investment Project Financing |
| Original EA Category | Revised EA Category |

Organizations

| | |
|---|--|
| Borrower | Implementing Agency |
| Ministry of Economy and Sustainable Development | Georgia's Innovation and Technology Agency |

Project Development Objective (PDO)

Original PDO

The objective of the project is to test the potential for technology transfer (i.e. commercializing science research) in Georgia. The project will use industry best practices to detect projects with commercialization potential and approach potential investors with a view to initiating deals on behalf of Georgian research and development institutions.



FINANCING

| | Original Amount (US\$) | Revised Amount (US\$) | Actual Disbursed (US\$) |
|---------------------------|------------------------|-----------------------|-------------------------|
| Donor Financing | | | |
| TF-B1729 | 1,114,651 | 638,294 | 342,599 |
| Total | 1,114,651 | 638,294 | 342,599 |
| Total Project Cost | 1,114,651 | 638,294 | 342,599 |

KEY DATES

| Approval | Effectiveness | Original Closing | Actual Closing |
|-------------|---------------|------------------|----------------|
| 09-Jun-2020 | 27-Jul-2020 | 20-Dec-2021 | 20-Dec-2021 |

RESTRUCTURING AND/OR ADDITIONAL FINANCING

| Date(s) | Amount Disbursed (US\$M) | Key Revisions |
|---------|--------------------------|---------------|
|---------|--------------------------|---------------|

KEY RATINGS

| Outcome | Bank Performance | M&E Quality |
|-------------------------|------------------|-------------|
| Moderately Satisfactory | Satisfactory | High |

RATINGS OF PROJECT PERFORMANCE IN ISRs

| No. | Date ISR Archived | DO Rating | IP Rating | Actual Disbursements (US\$M) |
|-----|-------------------|--------------|-------------------------|------------------------------|
| 01 | 07-Jun-2022 | Satisfactory | Moderately Satisfactory | 0.34 |

ADM STAFF

| Role | At Approval | At ICR |
|--------------------------|----------------------|----------------------|
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| | | |
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I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

Context

- 1. At the time of the project's design, the Georgian research community was developing research with potential for commercialization.** A 2015 report¹ on Georgia's potential for technology transfer pointed to a number of opportunities, especially in Tbilisi. According to the report, Tbilisi universities and institutes were hosting some excellent research in areas such as bacteriophages, microbiology, virology, diagnostics and specialized applications of physics and chemistry. The report also highlighted the fact Tbilisi was building critical mass of experienced and young scientists and engineers that could drive Georgian IP-rich innovations.
- 2. Yet innovation in Georgia lagged regional peers and micro, small, and medium enterprises (MSMEs) were underperforming.** At the time of project appraisal, only 13 percent of Georgian SMEs surveyed indicated that they had introduced a new or substantially improved product or service in the previous three years (compared to 67 percent in neighbouring Armenia). MSMEs in Georgia represented over 90 percent of registered businesses and more than 47 percent of formal jobs but accounted for less than 20 percent of GDP as compared to global averages of 40–50 percent and 60 percent in the Europe and Central Asia. This shortfall was mostly due to poor productivity, which was three times lower than that of large enterprises.
- 3. Georgia had launched several initiatives to facilitate innovation and entrepreneurship through the Georgia Innovation and Technology Agency (GITA).** Founded in 2014, GITA's mandate was to develop Georgia's innovation ecosystem through a range of programs and policy reforms. GITA had launched a small grant program for technology innovation open to individuals, NGOs, research organizations and universities. GITA had also inaugurated the Technology Park in Tbilisi in January 2016, which aimed to anchor a national network of innovation centers that could stimulate innovative activities and build awareness.
- 4. The World Bank's Georgian National Innovation Ecosystem (GENIE) project was partly addressing MSME innovation constraints.** The GENIE project commenced in June 2016 and will close in April 2023. The project is implemented by GITA and includes three components: (1) The 'Innovation Infrastructure' component finances community working spaces for innovation. This component includes financial support and training to stimulate internet use by households and firms. (2) The Innovation Services component comprises digital skills training and the provision of start-up acceleration services. (3) The 'Innovation Financing' component provides small and large innovation matching grants to firms, and finances applied research grants.
- 5. However, there was little support for IP generation or research commercialization in Georgia's innovation policy mix.** 'Technology transfer' refers to the commercialization of research and *transfer* of IP² into new products and services that can contribute to economic growth. Research commercialization can also lead to positive spillovers in the areas of environmental and social resilience. At the time of the project's design, Georgian research and development Institutes (RDIs) hosted four well-known technology transfer offices; Ilia State University, Tbilisi State University, Georgian Technical University, and Eliava Institute. Though these offices had received some donor-led training in technology transfer, results were weak as the RDIs lacked the necessary financial and human resources.

¹ Capital City Venture. (2015) Assessment Report: Research & Development Projects of Georgia

² Intellectual property



In addition, no individual institution produced enough projects of an advanced technology-readiness level (TRL) to sustain an internationally competitive, full-time technology transfer office.

6. **With support from the European Union and the World Bank, GITA decided to enlarge its portfolio of services by implementing the Technology Transfer Pilot Program.** The goal of the program was to test the potential for technology transfer in Georgia; the program aimed to assess the deal flow of projects in Georgia and to increase awareness among researchers and innovative SMEs of the technology transfer process. If the pilot was deemed a success – i.e., if it was determined that there was strong deal flow and community engagement - it was hoped that the program could be formally institutionalized through a centralized technology transfer office.
7. **The TTPP fit within the objectives of the Georgia Country Partnership Framework.** The TTPP aligned with the Georgia Country Partnership Framework which focused on providing support to Georgia across three main areas: enhancing inclusive growth and competitiveness, investing in human capital, and building resilience.

Project Development Objectives (PDOs)

8. The objective of the project was to test the potential for technology transfer (i.e., commercializing science research) in Georgia. The project used industry best practices to detect projects with commercialization potential and approach potential investors with a view to initiating deals on behalf of Georgian research and development institutions.

Key Expected Outcomes and Outcome Indicators

9. The PDO-level result indicator was to have at least one successfully closed technology transfer transaction. The project also tracked the number of service lines deployed, the number of technology transfer transactions initiated, and the number of beneficiaries reached.
10. The main beneficiaries included GITA, Georgian MSMEs with intent to introduce new or significantly improved products or services to the market, and research teams working in universities or research and development institutes (RDIs).

Components³

11. The project allocated €1,000,000 to finance commercialization activities outlined in bespoke commercialization roadmaps⁴. The TTPP financed services that could advance the commercial readiness of the technology as described in each research team's commercialization roadmap. Support was focused on two core activities:

³ The TTPP was not divided into formal components.

⁴ The 'commercialization roadmaps' can be thought of procurement plans for each research team. The development of the commercialization roadmap was financed through a sister trust-fund.

- i. Financing to advance commercialization transactions that still needed proof of commercial readiness. These services included legal services, commercial services and technical services like industrial testing, etc. The project also provided capacity building support to GITA on financial management activities.
- ii. Financing to connect prospective researchers with industrial partners looking for relevant technologies. These services included contract research, service contracts, business intelligence, and support in preparing project proposals for other donor programs.

II. OUTCOME

Assessment of Achievement of Each Objective/Outcome

| Indicator Name | Baseline | Target | Result | Statement of Achievement |
|--------------------------------|----------|--------|--------|--|
| PDO-Level Indicator | | | | |
| Transactions closed | 0 | 1 | 0 | Not Achieved. Three research teams are currently in deal negotiations. However, the TTPP was not able to reach a deal during the lifespan of the project. |
| Intermediate Indicators | | | | |
| Service lines deployed | 0 | 1 | 1 | Achieved. The TT service line was successfully launched in December 2020. |
| Transactions initiated | 0 | 1 | 4 | Exceeded. Deal negotiations have been initiated on behalf of four project teams. (In one case negotiations stalled when it transpired that market-ready testing would take 2 years). |
| Beneficiaries reached | 0 | 15 | 21 | Exceeded. The project reached 12 universities and 9 separate research and development institutions that are not otherwise under the umbrella of a university (e.g. Ferdinand Tavadze and Eliava Institute). |

(For detailed information on each research team, please see Annex 3)

Overall Outcome Rating

12. **The Outcome rating for the TTPP is Moderately Satisfactory.** The TTPP met the PDO objective of testing the potential for technology transfer in Georgia; the TTPP demonstrated that a critical mass of inventions originating in public research and development institutions in Georgia are viable. Through the TTPP, 72 project ideas were assessed through a thorough due diligence process, nine projects were selected for commercialization. Six teams signed non-disclosure agreements (NDAs) with foreign partners. Four of the research teams are in discussions with takers⁵ and three of those teams are in deal negotiations (see Annex 3). As such, all three intermediate indicators were met. In

⁵ A 'Taker' refers to an investor, licensee, customer, research partner and/or entity entering into a commercial relationship with the research team.



addition, as outlined below, the beneficiaries were very supportive of the program and are eager to participate in future, some even changing the way that they conduct their research. Furthermore, the Government of Georgia plans to adopt the program under the state budget. However, the PDO-level *indicator* went further than the PDO *objective*; measuring not just how many deals had *potential*, but how many were *closed*. As no research team was able to close a deal during the lifespan of the project, the project is deemed ‘Moderately Satisfactory’ rather than ‘Satisfactory’. The choice of PDO-Level indicator is discussed further in the ‘Bank Performance’ chapter.

13. **Georgia’s research community expressed satisfaction with the program.** The World Bank held consultations with representatives from all nine shortlisted teams, as well as academics and senior management from the Georgian Aviation University, Georgia Technical University, Tbilisi State University, Tbilisi State Medical University and Ilia State University. The World Bank also held a group meeting with 42 researchers as well as a second smaller session with 11 technology transfer officers to get feedback and reactions. The research teams and technology transfer officers were very satisfied with the program. This was the first time that most research teams had entered into active conversations with potential takers and certainly the first time that they had entered into deal negotiations.
14. **Furthermore, Georgian research teams are starting to take market considerations into account when planning and structuring research.** Many of the research teams that applied to the program primarily focus on pure research whose genesis is rarely related to direct applications. Moreover, the soviet heritage of the Georgian scientific community has led to an emphasis of supply-driven research for the sake of the expansion of knowledge. Nevertheless, several of the researchers consulted for this Implementation Completion and Results Report (including those that were not selected for the program) acknowledged that they have adjusted their decision-making practices as a result of the pilot and are now more likely to consider the potential requirements of future takers.
15. **The Government of Georgia plans to adopt and expand the program under the state budget.** As the TTPP has shown that there is a critical mass of inventions originating in public research and development institutions in Georgia, the government is now creating a central technology transfer office (TTO) as a department within GITA. The GITA TTO will operate on a not-for-profit basis. Responsibilities will include identifying promising projects, due diligence, developing commercialization roadmaps, supporting deal-making, and stimulating demand in the private sector.
16. **Lessons learnt through the pilot program have been documented and disseminated through a series of events and debriefing sessions.** Lessons garnered through the TTPP have informed a Technology Transfer handbook (funded through a sister trust fund) that will serve as an operation manual for GITA in future iterations of the program. GITA also coordinated two plenary sessions for local technology transfer officers and heads of research development institutes to share experiences and learnings from the program.
17. **Georgian researchers were invited to share experiences during a high-level dissemination event in June 2022.** As part of a series of closing sessions, beneficiaries of the Technology Transfer Pilot Program were invited to speak and share experiences during a plenary event on June 2nd, 2022. The Deputy Minister of Economy, Mr. Irakli Nadareishvili and the Deputy Head of Cooperation of the Delegation of the European Union to Georgia, Mr. Catalin Gherman provided opening remarks highlighting the uniqueness of the project and their commitment to furthering the technology transfer and innovation agenda in Georgia. The agenda included teams that were in active deal negotiations⁶ - alongside those that weren’t – in order to show a holistic picture and build awareness.

⁶ At the time of writing, three teams are in active deal negotiations.



III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

18. **The COVID-19 pandemic led to serious delays in a linked EU-funded program; the Georgia Institutional Capacity for Innovation project (GICI).** The TTPP is part of a wider EU-funded program to support GITA's institutional capacity for innovation in Georgia. While the TTPP (a recipient-executed trust fund) funded commercialization activities that were needed to close deals, the Georgia Institutional Capacity for Innovation project (a bank-executed trust fund) provided capacity building to GITA in technology transfer and commercialization processes. Through GICI, WB provided on-the-job training to support GITA in carrying out the due diligence on research projects, identifying potential takers and negotiating deals. However, the presiding global uncertainty made it difficult for GITA to garner investor attention⁷ and travel restrictions meant that GITA's due diligence of research-projects was conducted remotely, introducing further delays⁸.
19. **GICI delays led to corresponding delays to TTPP and constrained disbursements as the project could not be extended.** TTPP was approved in June 2020; three months after COVID-19 was declared a pandemic. TTPP's Project Operations Manual stipulated that no commercialization services would be financed until a potential taker had been identified (support to which was financed under the delayed GICI project). TTPP spending therefore began very late in the lifespan of the project. This had a knock-on effect on the disbursement potential of the project as there was no option for project extension⁹.
20. **The procurement mechanism used to finance roadmap activities also hampered progress.** Commercialization services were procured directly¹⁰ through the project under the World Bank procurement regulations for IPF borrowers. This approach was considered preferable to providing cash transfers (e.g., through vouchers and grants) to Georgia's publicly funded research and development institutions. This was because commercialization roadmaps were constantly evolving meaning procurement mechanisms needed to be nimble, while procurement systems in research institutions were generally sluggish. As it was, the World Bank's procurement mechanisms posed similar challenges. As an example, the purchase of raw materials needed to manufacture a prototype under the "Reinforced Structural Materials" research project was expected to take two to three months. Information was provided to the procurement team in November 2020 and the materials were delivered ten months later in September 2021; four months before the project closing date. Similarly, direct procurements of services such as IP and patent services, legal services, market research and lab services which were expected to take 2-3 weeks, instead took an average of 6-7 weeks due to extensive documentation, feedback and approval requirements. In other cases, potential takers were

⁷ As part of GICI, more than 6,000 companies were contacted and over 200 video and phone conferences were organized in the first nine-months alone.

⁸ "Due-Diligence" refers to the act of gaining a full understanding of an invention, its applications, the technology bricks supporting the research project, the technology-readiness level, the IP and ownership status, potential funding requirements and stakeholders. Due-diligence of research projects typically relies on in-person interviews, lab/site-visits and in-person testing. An inability to travel during the COVID-19 pandemic was particularly problematic for TTPP as Georgian scientists often presented their innovations without having solid, indisputable data supporting their claims. Additionally, locally-designed inventions rarely seemed to take stock of foreign benchmarks and there was a marked absence of clarity regarding ownership of IP and technology blocks. These are all issues that are easier and faster to resolve during intensive face-to-face visits rather than during piecemeal virtual meetings.

⁹ The TTPP was financed through an Administrative Agreement that was concluded under Indirect Management in the context of the 2016 Framework Agreement between the World Bank and the European Commission. This Framework Agreement specifically stipulated that individual procurement and grant contracts under the Administration Agreement must be signed by the Bank no later than thirty-six (36) months. As the Framework agreement expired in 2020, there was no option for extension.

¹⁰ This does not refer to the 'direct selection' procurement method but rather the fact that services were directly procured (on behalf of beneficiaries) by the project implementation unit rather than indirectly through cash transfers to beneficiaries.

interested in entering into a co-financing / co-investment arrangement, which was a difficult structure to adapt to the World Bank procurement framework. These issues eroded the interest of potential takers and undermined the reputation, credibility, and bargaining power of the TTPP team.

- 21. The project implementation unit was not well equipped to process the specialist procurements typical to research commercialization.** Efficient procurement of commercialization activities often requires a good technical understanding of the products or services in question (in order to write terms of reference for instance). In large TTOs in Europe, procurements are often managed by a team of purchasing officers who have collective expertise in a range of technical fields. Smaller TTOs rely on the procurement departments of the universities they work with. In the case of the TTPP, two procurement officers were assigned to the project, both of whom were familiar with World Bank procurement protocols through previous work on the Georgia National Innovation Ecosystem project. However, the technical knowledge required was far outside of the profile of a typical procurement officer, leading to further delays to procurement processing.

Table 1 – Project Finances¹¹

| | Original Amount | Cancelled Amount | Revised Amount | Actual Disbursed |
|-----|-----------------|------------------|----------------|------------------|
| EUD | 1,052,600 | 402,600 | 650,000 | 325,840 |
| USD | 1,114,651 | 423,010 | 638,294 | 342,599 |

- 22. In reflection of delayed disbursements, the Government of Georgia agreed to partial cancellation of €402,600, however the project only disbursed €325,840 of the remaining €650,000.** Although €1,052,600 was initially made available to the research teams, by June 2021 only €650,000 of activities had been identified. The World Bank, the Government of Georgia and the European Commission therefore agreed to transfer the remaining €402,600 from the TTPP to GICI - the sister trust fund¹². Even so, TTPP was only able to finance commercialization activities for three of the nine selected projects and only €325,840 (\$342,599) of the remaining €650,000 was disbursed before the project closing date (see Table 1). Had there been the option of extension, disbursements would have been higher.

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

Bank Performance

- 23. The Design rating for the TTPP is Moderately Satisfactory.** The project was well designed and allowed counterparts to test the efficacy of centralized commercialization team to detect promising projects and initiate deals on behalf of research teams. However, some improvements could be made in future iterations of the project (as outlined in Sections

¹¹ The TTPP was financed by the European Union. As such, trust-fund allocations and all official documentation (including the administrative agreement, the grant agreement and the letter confirming partial cancellation documents fund in Euros. USD values may not correspond as expected as they are system-generated and subject to currency fluctuations and cost recovery fees levied over the life of the project).

¹² These funds are supporting World Bank supervision of (i) the creation of the GITA TTO (ii) the development of medium-term key performance indicators based on return-on-investment (iii) the development of strong, long-term support by Georgia's research and development institutions and universities.



V). Notably, the way in which roadmap activities are financed, and the types of activities eligible for financing could be adjusted in future programs.

- 24. The Supervision rating for the TTPP is Highly Satisfactory.** GITA's implementation of the TTPP was subject to intensive World Bank supervision during implementation. This was due to the fact that supervision was a large, explicit component of a sister Bank-Executed Trust Fund; the Georgia Institutional Capacity for Innovation (GICI) activity. Through GICI, the World Bank team met with the entire GITA TTPP implementation team every two weeks during the project's lifespan and worked closely with the team on a day-to-day basis at the research project level. Bi-weekly meetings included a review of all projects, outstanding issues, and next steps. The bi-weekly meetings were also used as a forum to discuss possible policy implications arising from the activity. Minutes of every bi-weekly TTPP meeting was documented by GITA and circulated to all team members. Separately, the World Bank team produced monthly reports (for WB consumption only) to document progress and next steps. Representatives of the EU Delegation to Georgia were invited to the meetings as standard. In addition, 3 six-monthly progress reports¹³ were provided to the donor during the lifespan of the project.
- 25. The Monitoring and Evaluation (M&E) implementation and utilization rating for the TTPP is Moderately Satisfactory.** The Monitoring & Evaluation framework implementation and utilization was moderately satisfactory. The framework was extremely straightforward, essentially asking four clear questions; (1) Did GITA launch a technology transfer service? (2) How many beneficiary organizations were invited to participate? (3) How many research projects showed deal potential as a result of the TTPP? (4) How many deals were closed? The team was able to track these indicators with ease.
- 26. However, the M&E design rating for the TTPP is Moderately Unsatisfactory.** The fourth question - the PDO-level *indicator* - went further than the PDO *objective*; measuring not just how many deals had potential (72), but rather how many were closed (0). This ambitious indicator focused the mind of the TTPP team but its fulfilment was beyond the control of the project. Instead, the three intermediate indicators were more in line with the PDO objective. Softer indicators could also have been included to track the demonstration effect of the TTPP (e.g. willingness of participants to engage in technology transfer initiatives in the future).

Compliance Issues

- 27. Due to the TTPP's designation as a 'targeted grant' by Georgia's Treasury, GITA relied on Designated Account (DA) advances which required exceptions after the project closing date.** The TTPP was considered by the Government of Georgia to be a "targeted grant" (not a loan), therefore the Treasury did not allow the use of direct payments. Instead, the team relied on DA advances to implement the project. When the TTPP project closed on December 20th, 2021, there were outstanding payments of approximately €244,000. Ordinarily, World Bank guidelines permit project implementation units to make direct payments against such contracts during the grace period; but DA advances are not usually permitted after the Project Closing Date. After consultation with the Task Leader and the WBG Trust Fund & Loan Operations Department, GITA were permitted to make advance requests to the DA during the grace period.
- 28. No Implementation Status Report (ISR) was filed during the life of the project.** After the project had closed, the team discovered that the project had been mis-classified as a Preparation Fund instead of a Main Fund when the Grant Funding Request was made. As a result, the World Bank Operations Portal did not prompt the team to file an ISR during the project's 18-month lifecycle. Once the issue was discovered, the project was reclassified ex-post. As noted above

¹³ Note that the progress reports covered all activities under the EU-funded program including those outside of the TTPP.



in paragraph 24, implementation progress was monitored closely and minutes of bi-weekly meetings were prepared as well as monthly internal World Bank reports.

V. LESSONS LEARNED AND RECOMMENDATIONS

- 29. Strong relationships and trust are key to successful technology transfer activities.** As the project was one of the first of its kind in the World Bank, several issues arose without a clear precedent and required some creativity to resolve them. The project benefitted from strong working relationships between the World Bank, GITA, and the research teams in this regard. Technology transfer also relies heavily on the personal relationships and contact databases of technology transfer consultants. Therefore, a strong degree of trust is needed in order for consultants to invest their time and reputation into the program. Clear communication channels between all parties are therefore crucial to program delivery. Involving university technology transfer officers more directly in the project could also increase the transparency and awareness between parties.
- 30. Early proof-of-concept testing could be introduced to similar programs as a routine activity.** The Project Operations Manual stipulated that no commercialization services would be financed until a potential taker had been identified. This was to ensure that the TTPP was supporting projects for which there was a market. Future teams might reconsider this stipulation; proof-of-concept tests that can demonstrate that the research team's pledge is accurate would advance the commercial viability of the project. Such preliminary validations tests could also reduce financing and reputational risk as they would preclude the technology transfer team from discovering at an advanced stage that the research team's claims are not fully accurate (thereby undermining their credibility).
- 31. Future teams could consider alternative implementation mechanisms for similar programs.** The task team would recommend that future teams avoid directly procuring technology transfer services on behalf of research teams. As an alternative, teams might consider indirect financing through cash transfers (e.g., voucher schemes and grants). Where teams must procure services directly, dedicated procurement officers should be integrated as a core member of the technology transfer teams such that they participate regularly in team meetings and can help navigate procurement guidelines in such a way that could still satisfy the needs of the program.
- 32. The Pilot approach was considered as an "eye-opening" program for Heads of universities and RDIs.** The hands-on testing of methodologies that were new to the Georgian scientific community and not only helped to demonstrate that technology transfer activities were possible but also that they were necessary in order to grow the Georgian innovation ecosystem. Despite some initial resistance from stakeholders, most research institutions and universities agreed that the creation of a centralized technology transfer organization within GITA was the most appropriate way to foster relationships between academia and private sector – both local and international.



ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS



A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: The Project will use industry best practices to detect projects with commercialization potential and approach potential national and international investors with a view to initiating deals on behalf of

| Indicator Name | Unit of Measure | Baseline | Original Target | Formally Revised Target | Actual Achieved at Completion |
|---|-----------------|---------------------|---------------------|-------------------------|-------------------------------|
| Technology Transfer Transactions closed | Number | 0.00 19-Dec-2018 | 1.00 27-Jul-2020 | 1.00 20-Dec-2021 | 0.00 02-Jun-2022 |

Comments (achievements against targets):

Not Achieved. Three research teams are currently in deal negotiations. However, the TTPP was not able to reach a deal during the lifespan of the project.

A.2 Intermediate Results Indicators

Component: Financing of product development services for selected awardees to connect prospective researchers with industrial partners looking for relevant technologies

| Indicator Name | Unit of Measure | Baseline | Original Target | Formally Revised Target | Actual Achieved at Completion |
|--|-----------------|---------------------|---------------------|-------------------------|-------------------------------|
| Technology Transfer Service Lines Deployed | Number | 0.00 19-Dec-2018 | 1.00 27-Jul-2020 | 1.00 20-Dec-2020 | 1.00 02-Jun-2022 |

Comments (achievements against targets):



Achieved. The TT service line was successfully launched in December 2020.

| Indicator Name | Unit of Measure | Baseline | Original Target | Formally Revised Target | Actual Achieved at Completion |
|--|-----------------|---------------------|---------------------|-------------------------|-------------------------------|
| Technology transfer transactions initiated | Number | 0.00 19-Dec-2018 | 1.00 27-Jul-2020 | 1.00 20-Dec-2020 | 4.00 02-Jun-2022 |

Comments (achievements against targets):

Exceeded. Deal negotiations have been initiated on behalf of four project teams. (In one case negotiations stalled when it transpired that market-ready testing would take 2 years).

| Indicator Name | Unit of Measure | Baseline | Original Target | Formally Revised Target | Actual Achieved at Completion |
|---|-----------------|---------------------|----------------------|-------------------------|-------------------------------|
| Beneficiaries reached through technology transfer one-to-one facilitation by GITA | Number | 0.00 19-Dec-2018 | 15.00 27-Jul-2020 | 15.00 20-Dec-2021 | 22.00 07-Jun-2022 |

Comments (achievements against targets):

Exceeded. The project reached 12 universities and 9 separate research and development institutions that are not otherwise under the umbrella of a university (e.g. Ferdinand Tavadze and Eliava Institute).



ANNEX 2. PROJECT COST BY COMPONENT

| Components | Amount at Approval (US\$M) | Actual at Project Closing (US\$M) | Percentage of Approval (US\$M) |
|--|---------------------------------------|--|---|
| Demonstration Effects of Innovation Support through a Technology Transfer Pilot Project(RE) | 0 | 1136913.00 | 0 |
| Total | 0.00 | 1,136,913.00 | 0.00 |



ANNEX 3. Research Project Level Outcomes

| | Research Project | Technology Offering | Commercial Services Funded Under TTPP | Status / Outcome |
|---|---------------------------------|---|---|--|
| 1 | Acoustica | Safe, faster, cheaper technology for diagnostic inspection and monitoring of oil storage tanks. | n/a | Discussions Stalled Despite marketing efforts, team was not able to identify an industrialist able to empty an oil tanker for testing. |
| 2 | Manganese for Lithium Batteries | Innovative process based on electro-leaching and autoclaving to convert the 40-50% rich Mn ore of Georgia into HPMSM for NMC cathode production | IP Strategy services, Testing, Commercialization services | In Negotiation The team have an NDA with a large battery manufacture (recently acquired by a large automobile multinational). After positive test results, negotiations are ongoing, and a face-to-face meeting is planned for June 2022. |
| 3 | Reinforced Structural Materials | Process technology for production of new multi-functional ceramic materials based on carbon, nitrides and borides from affordable and abundant raw materials by use of self-propagating high-temperature synthesis. | Testing | In Negotiation The two parties are in discussion with a French research consortium to enter into a joint research program with a view to developing a shared intellectual property asset. |
| 4 | Dualler-G | Anti-allergic drugs with wider spectrum of anti-allergic activity. | Commercialization services, Testing | Discussions Stalled Team entered into negotiations with largest retail pharmacy network in the S. Caucasus for exclusive rights to distribute the product. However, the EU-based manufacturer required two years to complete tests. Negotiations have stalled as a result. |
| 5 | Watchdog | Robust, low-cost monitoring system to warn of incipient landslides and eventually to help protect communities and infrastructures | n/a | Tests Ongoing A public entity responsible for a region prone to landslides and mudslides have agreed to test the technology. (Testing costs assumed by taker). |
| 6 | Pseudo Proteins | Biodegradable polymers for versatile biomedical applications | n/a | Discussions Stalled Though the team was in discussion with two takers, both changed their R&D focus as a result of the COVID-19 pandemic. |
| 7 | SuperBran | Novel milling process technology which results in superior grain with a changed structure and particle size, that has different physiologic effects compared to the conventional bran | Market Research, Patent Services, Testing, Legal services | In Negotiation Negotiations are underway with two Brazilian firms. Final face-to-face negotiations are planned for mid-May. |
| 8 | EcoBall | A method of production of Expanded Clay balls from Duruji clay shale that ensures cost effectiveness and energy efficiency | n/a | Discussions Stalled TTPP team yet to identify takers. |
| 9 | Lignin Modified Enzymes (LME) | Extracellular oxidative enzymatic system of white rot basidiomycetes consisting of different extracellular lignin-modifying enzymes | n/a | Discussions Stalled Extensive interest has not yet resulted in negotiations. (Teamed signed NDA with Canadian research company that later filed for bankruptcy). |



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