



SHANZHAI CITY

Making Data Valuable for Humanity

Executive Summary
2019

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INTRODUCTION

Shanzhai City is a Hong Kong-based company that creates civic technology¹ designed to combat poverty and promote sustainable development. Utilizing our proprietary platform, we improve the management and implementation of social development² and social finance³ projects in last-mile communities. The technology ensures that aid reaches its intended target, unlocks the potential of marginalized communities to contribute to their own development, and enables the providers of aid to continuously and confidently monitor and evaluate its impact in real time.

Shanzhai City makes a successful contribution to international development by connecting beneficiaries with aid providers, allowing them to regularly communicate results and express preferences about how a project should be implemented, as well as to create, deploy, and digitally participate in social finance solutions that are designed to fill the gaps where development finance institutions lack coverage. The technology is **automated, transparent, incorruptible, accessible** to beneficiaries, and **cost effective**.

Shanzhai City has left a footprint in over a dozen countries, spread across several continents. It is providing solutions for victims of modern slavery, children in need of nutrition aid, marginalized communities with no access to banking facilities or government support programs, and farmers seeking to create cooperative finance solutions to improve crop productivity and market access. The team endeavors to create a lasting positive impact on the lives of millions of people.

¹ **Civic technology** – “technology that enables engagement, participation or enhances the relationship between the people and government by enhancing citizen communications and public decision, improving government delivery of service, and infrastructure” (https://en.wikipedia.org/wiki/Civic_technology).

² **Social development** – projects, resources, and capital devoted to a wide range of humanitarian efforts, including (but not limited to): “poverty eradication, the reduction of inequalities, employment generation, the promotion of cooperatives, family, the role of civil society, older persons and ageing, youth, disability, and indigenous people” (UN Department of Economic and Social Affairs).

³ **Social finance** – investment in and lending to companies which consider themselves social enterprises, charities, co-ops, or other purpose-driven organizations. A core component of all social finance vehicles is the need to measure the impact of outcomes from actions delivered, where program re-evaluation occurs for both operational and financing considerations.



Consensus building with DApps for Micro Social Impact Bonds, Myanmar

THE CHALLENGE

International development suffers from a number of fundamental challenges that are preventing marginalized communities from reaching their full potential.

First, several international funders remain concerned that often aid does not reach (or positively impact) its intended beneficiaries, while monitoring the actual impact can be an expensive undertaking.⁴ As a result, they have been reluctant to support development projects, even in crisis situations.

Second, large numbers of the world's poorest people are disconnected from virtually all forms of services, including government services, and banking and credit facilities. In some communities, people do not even have any form of documentation, which means that they cannot prove their identity or their title to property, and cannot access basic services.⁵

The upshot of this is that the delivery of aid to these communities requires costly investment in infrastructure, international staffing, and monitoring mechanisms, in order to document each individual household and its needs. Also, any capital that may exist at a local level cannot be deployed effectively to benefit marginalized communities.

These limitations are significantly impeding the world's ability to meet current international development targets. In 2014, the United Nations estimated that funding of US\$3.9 trillion needs to be made available annually up until the year 2030, if the Sustainable Development Goals (SDG)⁶ are to be achieved.⁷ However, over the past few years, only US\$1.4 trillion in annual funding has been made available, resulting in a US\$2.5 trillion gap per year.⁸ Significant amounts of private and public sector capital are available to fill this gap, including in regions that desperately need such resources; but this money cannot be deployed for the reasons set out above.

4 Monitoring the impact requires a level of research expertise, a commitment to longitudinal study, and allocation of resources that are typically beyond the capabilities of implementing organizations.

5 According to the World Bank Group's 2018 ID4D Global Dataset, an estimated 1 billion people around the globe face challenges in proving who they are. Early findings suggest that residents of low-income countries, particularly women and the poorest 40%, are those most affected by a lack of ID.

6 **United Nations Sustainable Development Goals (SDG)** – a collection of 17 global goals set by the United Nations General Assembly in 2015. The SDGs are part of Resolution 70/1 of the United Nations General Assembly: "Transforming our World: the 2030 Agenda for Sustainable Development" (or just the "2030 Agenda"). The UN has set a target capital deployment in support of the SDGs, and this has given huge momentum to social finance markets, as a platform from which to work with global networks of policy-makers, capital markets, social development projects, and communities in need.

7 United Nations Conference on Trade and Development (UNCTAD) has established that the financing requirements in the developing countries' key SDG sectors are within the range US\$3.3 to 4.5 trillion annually, with a midpoint of US\$3.9 trillion. See breakdown in UNCTAD World Investment Report 2014, Table IV.2.

8 A recent report by the Business & Sustainable Development Commission estimates that achieving the SDGs could open up US\$12 trillion of market opportunities in food and agriculture, cities, energy and materials, and health and well-being alone, and create 380 million new jobs by 2030. Read more at: <http://report.businesscommission.org/report>

SOCIAL FINANCE SOLUTIONS

Shanzhai City's services and technologies have been built up in the course of a decade of solving problems in social development and social finance. Our objective is to encourage more efficient and robust sustainable development, by creating digital solutions for those parts of the world that do not have access to basic frameworks for identity, banking, finance, commerce, and trade, to ultimately unlock the capital needed for social development projects.

Our technologies generate immediately transparent near real-time (nRT)⁹ impact data¹⁰ from the frontline, and at the same time support the creation of digitally enabled social finance instruments that rely on the flow of outcomes/impact data. They build trust where there is a lack of institutions of trust (i.e., banks), gradually reducing the costs of transparency and capital outlay for social development projects.

The platform leverages distributed ledger technology (DLT)¹¹ and artificial intelligence (AI),¹² where: **DLT** is a data storage system used for creating immutable records of transactions that enable:

1. the construction of digital identification that promotes program participation by protecting user privacy and self-sovereign data.¹³ The most important step is connecting the last mile first, so that people in developing communities without formal identification can participate in social programs or financial services;
2. the deployment of conditional finance vehicles (i.e., impact bonds), which are instruments that help to structure public-private-partnership financing models, promoting more social and economic inclusion;
3. the distribution of incorruptible voting and validation measures, enabling the preferences of beneficiaries, end users, and stakeholders as they relate to program governance to be captured with confidence; this is necessary in order to understand past impacts on target communities, as well as desired future impacts;



Consensus building with DApps for Micro Social Impact Bonds, Myanmar

9 Near real-time (nRT) – refers to a minor time delay introduced by automated data processing or network transmission. Near real-time processing is used when speed is critical, but a few minutes of delay are acceptable. Near real-time processing is well-suited for the data analysis of historical and archived data for strategic, planning, and policy-making purposes, allowing human-centered decision making instead of completely automated decision-making.

10 Impact data – these datasets are used to measure the success of sustainable development and “social impact” projects: *outcomes data* measure the presence of certain events or the degree to which they occur as a result of investments made or actions taken; *impact data* measure certain prescribed types of impact, which may include both tangible/quantitative and intangible/qualitative measures that follow a particular theory of change.

11 Decentralized ledger technology (DLT) – “... allows digital information to be distributed, but not copied. That means each individual piece of data can only have one owner. You may hear it described as a ‘digital ledger’ stored in a distributed network. Blockgeeks has a good analogy to help understand how Blockchain works:

‘Picture a spreadsheet that is duplicated thousands of times across a network of computers. Then imagine that this network is designed to regularly update this spreadsheet and you have a basic understanding of the blockchain.’

The information is constantly reconciled into the database, which is stored in multiple locations and updated instantly. That means the records are public and verifiable. Since there's no central location, it [is] harder to hack since the info exists simultaneously in millions of places” (<https://medium.com/the-mission/a-simple-explanation-on-how-blockchain-works-e52f75da6e9a>).

12 Artificial intelligence (AI) – a branch of computer science dealing with the simulation of intelligent behavior in computers.

13 Self-sovereign data – data that are owned and controlled by the creator of the data.

and **AI** is an advanced computational system used for the analysis of vast quantities of data towards:

1. optimization of program operations and capital deployment;
2. discovery of patterns to help suggest problems and inform solutions.

Together, this system of information storage and analysis creates conditions that foster trust towards building civic and social finance projects that require the validation of results to trigger conditional finance vehicles, like pay-for-success (P4S)¹⁴ and social impact bonds.

The criteria for measuring success are pre-defined using DLT, which ensures that data transmission is transparent, reliable, and incorruptible, and which gives investors and donors confidence that their funds are reaching their intended target. The pre-defined programs also facilitate incentivization schemes for beneficiaries.

At every step, and with each interaction, beneficiaries generate data that are used to improve social development projects and to execute social finance mandates. The data can take many forms and are context specific. One example is a project whose objective it is to improve early childhood development (ECD)¹⁵ through the provision of nutrition aid and ECD training: parents upload photographs of nutrition aid delivery (verified through barcodes) to prove that the beneficiaries are receiving the aid; they also share behavioral data (such as children's ECD responses), and academic test scores over a significant period of time. This information is used to correlate the way in which ECD aid affects the neuronal development of children, who otherwise would not have access to adequate nutrition or developmentally appropriate inputs for them to reach their full potential. Moreover, all this information, plus other data derived from various projects, can be pulled together and analyzed using AI-based systems to produce an evaluation that can offer powerful insights – including how to improve program operations, how to scale the program, and where to deploy more capital.

Shanzhai City's proprietary technology platform connects investors, donors, and beneficiaries, allowing anyone to be a stakeholder for change. Our platform fills the information gap in the economy of sustainable development, building a digital operating system for social finance.



Last mile data collection for Early Child Development, China

¹⁴ **Pay-for-success (P4S)** – also known as a social impact bond (SIB); this often involves public-private partnerships funding effective social services through a performance-based or outcomes-based contract. P4S projects enable federal, state, and local governments to partner with high-performing service providers, by tapping into private investments to expand effective programs. Conditional finance can also extend purely into the private sector, where the financing is dependent on pre-existing conditions being met, or outcomes-based goals and milestones being reached, or both.

¹⁵ **Early childhood development (ECD)** – the physical, cognitive, linguistic, and socio-emotional development of a child from the prenatal stage up to age eight (World Bank). ECD is the field where the iO₂ Foundation began to incentivize beneficiary families in China and Brazil to report last-mile data using digital strategies, while at the same time safeguarding the privacy of vulnerable populations.



Home visit digital validation for Early Child Development, China

OUR APPROACH

Shanzhai City adopts a context-specific approach to each of our projects. In all cases, we follow a number of crucial steps that have a proven track record of success in a wide variety of contexts:

1. **Defining objectives** – Right at the outset, the specific aid agencies and/or target communities communicate their objectives to us; we then use these to start formulating ideas about the types of solutions that could be developed for each specific case.
2. **Consultations** – We organize consultations with beneficiaries in the target communities and with the aid agencies, with a view to gathering more information about their interests, learning more about local conditions, and testing preliminary ideas about potential solutions.
3. **Development** – Drawing on the data acquired, we develop/configure the technology ecosystem, the platform, and the appropriate social impact finance instruments that will form the core services. The front-end application is then (wherever possible) downloaded onto the mobile devices of the target-community stakeholders, and the end-to-end flow of data and capital is tested before being deployed.
4. **Training** – We carry out train-the-trainers (TTT)¹⁶ sessions in the target communities to ensure that the applications will be used as effectively as possible and will serve the largest possible population. Through this process, we promote digital and financial literacy with end users, to increase long-term secondary impacts in their communities.
5. **Implementation** – Once the application has been deployed, beneficiaries immediately start generating data. This could be photographic evidence of aid delivery; an expression of how they would prefer project implementation to proceed; voting on whether specific actions should be adopted, etc. The beneficiaries can gain from the various digital incentivization schemes that the platform offers.
6. **Analysis** – We operate our own in-house think tank, which focuses exclusively on data analysis for the purpose of developing project-specific responses and formulating recommendations for how social needs can be satisfied. Our analysis is made useable and accessible both to end beneficiaries and to donors.

¹⁶ **Training-the-trainer (TTT)** – an education model which identifies individuals and trains them up to train, teach, or mentor others. This is a critical component in the deployment and long-term adoption of new technologies or methodologies in developing communities, without which new initiatives would fail over time.

OUR TECHNOLOGIES

Shanzhai City's core technologies leverage DLT and cloud-based¹⁷ services. They include a means of identifying beneficiaries and their needs through DLT-based identification (DID).¹⁸ This offers a way of incentivizing stakeholders to validate program outcomes. Our three core technology solution offerings are critical to ensuring the successful deployment of social finance technologies in developing regions and markets:

1. **Decentralized identification (DID)** – DID is a know-your-client and anti-money laundering (KYC/AML)¹⁹ protocol that gives beneficiaries digital identities and allows aid providers to receive a steady flow of information from those beneficiaries on issues such as the effectiveness of the aid they are receiving through the relevant projects, with a view to improving the deployment of services and capital. What this means is that beneficiaries are enabled (and are incentivized) to participate in the governance of social programs, and to provide a steady stream of information about the aid programs.
2. **Last-mile data marketplace** – Also known as the Oracle Marketplace,²⁰ this is the protocol by which automated incentivization occurs: data-seekers can post bounties for data supplied; while data-providers can earn rewards by providing verifiably accurate data. These datasets are needed to trigger tiered capital deployment, payments, refunds, etc. when beneficiaries provide the data that validate target outcomes. This also enables aid providers to carry out deeper analysis via data science.
3. **Smart social finance** – With DID and the data marketplace infrastructure established, Shanzhai City creates a specific digital financial tool on DLT for each project. This releases funds when all the conditions set out in the smart contracts²¹ (or a series of digital pre-conditions) are met. The tools that Shanzhai City creates are the result of participatory consultations between all stakeholders.



¹⁷ **Cloud** – a vast global network of remote servers, acting together to operate as a single system. Cloud networks in the blockchain environment are typically storage servers accessed off-chain (not in the blockchain environment, but rather the typical centralized system), and may contain groups of applications or microservices that allow users to interact with the data accordingly.

¹⁸ **DID** – decentralized identification: an identity that is fully under the control of the identity subject, and is independent of any identity provider, certificate authority, or centralized registry. DID is often referred to as “self-sovereign identity”, under which concept people own and store their own identity data on their own devices, without relying on a central repository.

¹⁹ **KYC/AML** – “know your customer” and “anti-money laundering”: the process by which an organization or individual identifies and verifies the identity of its stakeholders, in order to build trusting relationships and prevent fraudulent activities.

²⁰ **Oracle Marketplace** – an Oracle is the mechanism that brings real-world data into a DLT environment; therefore, an Oracle Marketplace is a platform where users may trade data for fiat money, digital assets, or other values.

²¹ **Smart contracts** – one of blockchain's core technologies, intended to facilitate, verify, or enforce the negotiation or performance of a contract digitally or automatically. It allows credible transactions without third parties, where transactions are trackable and irreversible.



Family participants in Early Childhood Development Program, Brazil



Portable Last-Mile Data Access Point, China

OUR EXPERIENCE

Shanzhai City has deployed its technology and services in countries across the globe, to support development projects that are designed to benefit millions of individuals in need. These projects include the following:

- **Early Childhood Development (ECD), China** – Shanzhai City was retained by China's State Council to improve implementation of the Early Childhood Education Program – one of the flagship projects of the China Development Research Foundation. The project seeks to improve neural development among children born into poverty, by providing families with an early childhood development curriculum, along with nutritional supplements. Shanzhai City has established automated technology solutions that improve the State Council's ability to ensure that the assistance is being delivered properly. Shanzhai City has also developed – and is constantly improving – artificial intelligence-based systems that offer the State Council a better understanding of the impact that early childhood development assistance has on the vitality of a community. Among other things, all stakeholders can track the evolution of children's performance across a range of school class subjects after they start receiving the food aid. Individual school grades are uploaded by parents on their smartphones. Parents also upload photographs of their children's living space, which are then analyzed by our artificial intelligence systems (through computer vision²² and machine learning²³). This type of data is gathered over a period of years to determine if there is an improvement in school grades and if the children's living conditions are getting better, and whether or not there is causation between the aid and long-term development trends. This project is funded by the Gates Foundation and the Ford Foundation.
- **Early Childhood Development (ECD), Brazil** – Brazil's Federal Ministry of Social Development (Ministério do Desenvolvimento Social – MDS) retained Shanzhai City to provide assistance to the Boa Vista municipality's early childhood development program. As well as developing and deploying a fully digital monitoring and evaluation system, Shanzhai City is developing technology-based alerts, so that particularly vulnerable individual cases are identified quickly enough for effective interventions to be made or response teams to be sent out. This project is funded by the World Bank, UNICEF, the MDS, the Bernard van Leer Foundation, and the Mayor's Fund of Boa Vista.
- **Anti-Slavery Countermeasures, Malaysia** – At the end of 2018, a Malaysian government-funded palm oil giant was sanctioned by the largest palm oil certification scheme – the Roundtable on Sustainable Palm Oil (RSPO) – for the use of forced labor, for being complicit in the trafficking of workers, and for the dire conditions that its workers were forced to live in.²⁴ This move contributed to a growing international embargo on the palm oil industry in Malaysia. In response, Malaysia's Ministry of Human Resources retained Shanzhai City to develop technology-based solutions that would prevent any recurrence of these practices and that would ultimately contribute to a lifting of the international embargo. Among other things, Shanzhai City has converted all worker agreements to smart contracts: these preclude the illegal withholding of pay and provide beneficiaries with a way of reporting human rights violations.
- **Outcomes Based Finance, Myanmar** – Shanzhai City was retained by the Myanmar government to develop a pay-for-success pilot program that allows villagers to invest and leverage their own capital in the construction of local development projects. Shanzhai City's systems allow villagers to hold funds in escrow, to monitor project progress through technology-based solutions, and to deploy their funds according to milestones that are digitally validated by the community. Shanzhai City's intervention in this project is unique, since it has developed automated and technology-based solutions in marginalized communities that do not have access to traditional financing and banking facilities, or to government support.

²² **Computer vision** – “an interdisciplinary scientific field that deals with how computers can be made to gain high-level understanding from digital images or videos” (https://en.wikipedia.org/wiki/Computer_vision).

²³ **Machine learning** – is a field of artificial intelligence (AI) that “uses statistical techniques to give computer systems the ability to ‘learn’ (progressively improve performance on a specific task) from data, without being explicitly programmed” (https://en.wikipedia.org/wiki/Machine_learning).

²⁴ Wolinsky, J. (29 November 2018). Palm Oil Giant FELDA Sanctioned Over Forced Labor, Human Trafficking. Retrieved from <https://www.valuewalk.com/2018/11/palm-oil-giant-felda-sanctioned> on 14 December 2018.

- **Cooperative Seed Bank, Laos** – Shanzhai City was retained by the Laos Ministry of Agriculture to develop a seed bank mobile application that allows paddy rice farmers to own a digital identification and wallet, and to tokenize²⁵ their seed assets as savings, payments, or collateral. The project's objective is to help farmers to reduce seed waste, increase yields, and boost their overall buying power and economic access. The seed bank application is supported by decentralized identifications, community currency tokens, and microfinance smart contracts.
- **Community-Based Trade, Papua New Guinea** – Shanzhai City was retained by the Papua New Guinea Ministry of Agriculture to build a community-trading mobile application that enables coffee bean, cocoa, and coconut farmers to own a digital identification and wallet with data protection, and to conduct cashless trades with mills, using community currencies. The project's objective is to assist the country's marginalized and rural population – which has little access to formal finance – in actively participating in the local economy.
- **Agricultural Cooperatives, China** – Shanzhai City is working with the Liping County Government in China to develop a mobile application for cooperative shareholders. This will increase opportunities for sharing resources and will guarantee that profits are appropriately distributed. The software allows farmers to create protected identifications, and to contribute their money, land, cattle, labor, and agricultural tools individually and collectively as shares in the cooperative. Documented practices and contributions are recorded as credits on the DLT, enabling tamperproof and transparent calculations of annual dividends and profits. At the end of the year, if the cooperative returns a profit, farmers will earn dividends based on the amount that they have contributed. These will be guaranteed through DLT.
- **Community Time Bank, Hong Kong** – Shanzhai City is collaborating with the Hong Kong Council of Social Services to develop a time bank mobile application, which will enable the low-income population to generate economic value through their time and skill set – factors that normally go unrecognized by the mainstream labor market. This application offers a marketplace that allows everyone in the city to post the services they need, on the one hand, and, on the other, to offer their skill set and time.
- **Farm-to-Table Fair Trade Tracking** – China and Southeast Asia. Shanzhai City has created a digital provenance platform for the Goods for People Program, a farm-to-table certification organization that works across China and Southeast Asia. This platform allows all stakeholders in production and distribution to transact goods along the supply chain, and to participate in documenting environmental and social conditions. All data are stored on the DLT, which ensures a sound footing for the purposes of certification, auditing, and building trust with clients and consumers.

²⁵ **Tokenize** – “the process of substituting a sensitive data element with a non-sensitive equivalent, referred to as a token, that has no extrinsic or exploitable meaning or value” ([https://en.wikipedia.org/wiki/Tokenization_\(data_security\)](https://en.wikipedia.org/wiki/Tokenization_(data_security)))



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GOVERNMENT-COMMUNITY FINANCE & CIVIC ENGAGEMENT SOLUTION

0% DEBENTURE, DUE JANUARY 31, 2019

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