Rahat

CASE STUDY-

Using Blockchain for Cash Distribution


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Overview

In collaboration with UNICEF Office of Innovation, UNICEF Nepal, and the Rumsan team, a blockchain-based digital cash and voucher pilot was implemented in Jaleshwor, Madhesh Pradesh, Nepal. Rahat, the blockchain solution developed by Rumsan, strengthened humanitarian aid efforts by promoting financial inclusion, accountability, and transparency throughout the cash transfer process.

Rahat seamlessly facilitated the issuance, management, and monitoring of cash distribution through secure and transparent blockchain-based digital tokens. This transformative approach empowered beneficiaries to easily redeem their tokens using feature phones (via SMS) or unique QR code cards, irrespective of their banking status. Moreover, Rahat empowered government bodies such as Palikas (Municipality) and Ward members to efficiently monitor distribution efforts and enhance reporting to donors, ensuring a cohesive and comprehensive understanding of cash support for both banked and unbanked beneficiaries. With real-time monitoring and reporting capabilities, UNICEF Nepal gained valuable insights into the distribution process.

The streamlined and automated cash distribution process enabled local stakeholders to scale up their approaches, reaching the most vulnerable unbanked beneficiaries efficiently, with real-time financial reconciliation.

This case study serves as a testament to the potential of blockchain technology in transforming humanitarian aid, fostering financial inclusion, and driving positive impact in vulnerable communities. Rahat's successful implementation in Jaleshwor exemplifies how blockchain can revolutionize traditional aid models, ensuring greater transparency, efficiency, and support for those who need it the most.

Pilot Background

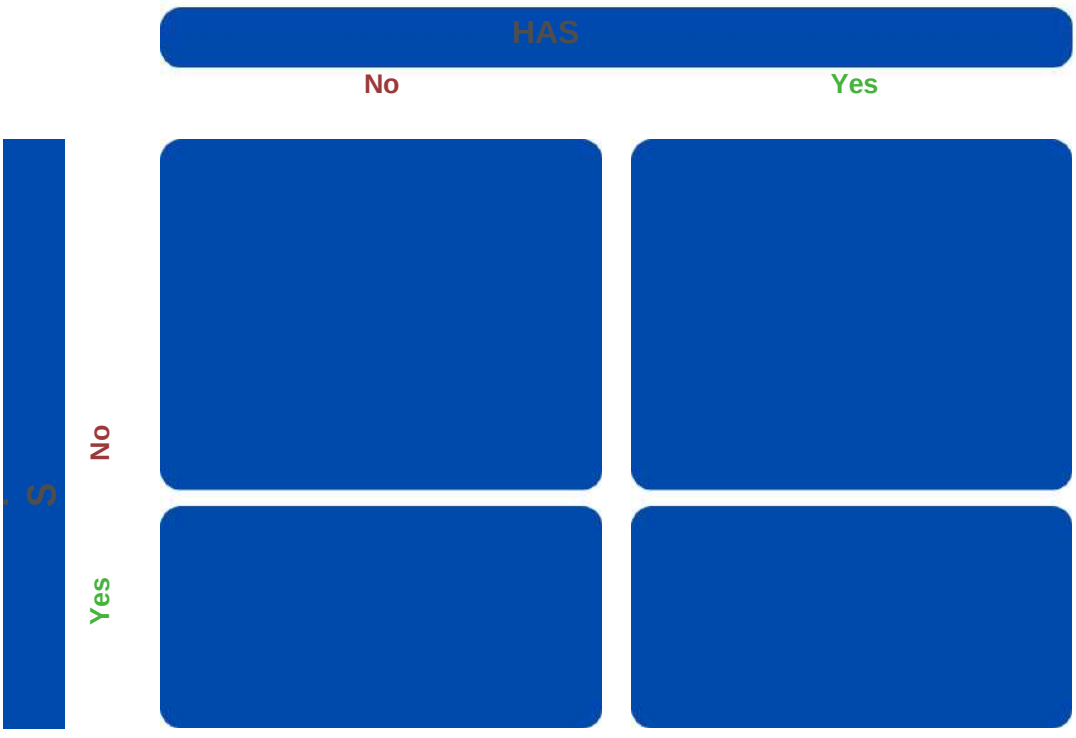
Jaleshwor Municipality(Palika), located in Mahottari district, is identified as one of the flood-prone areas in the Madhesh Pradesh province of Nepal. This region was significantly impacted by both recurring floods and the socio-economic repercussions of the Covid-19 pandemic, exacerbating the challenges faced by the local population.

The selection of 1,900 beneficiaries for this pilot project targeted vulnerable households with children under five years. The households were further targeted with the following criteria from UNICEF Nepal: being landless, having daily wage earners, or having family members with disabilities. By adopting this approach, the project aimed to provide support to the most vulnerable households within the Palika, ensuring that assistance reaches those who are most in need.

Process Flow:

UNICEF Nepal initiated the project digitally, incorporating the respective Palika into the Rahat dashboard. The budget amount was transferred to Palika's bank account, with each transaction recorded and tracked through a blockchain "handshake" to ensure secure and transparent fund flow.

Beneficiaries were enrolled into the Rahat platform by social mobilizers using the Kobo Toolbox. Based on their access to mobile phones and banking services, beneficiaries were classified into four distinct categories: Unbanked with phone, Unbanked without phone, Banked with phone, and Banked without phone. This classification enabled tailored and convenient aid distribution for each group.

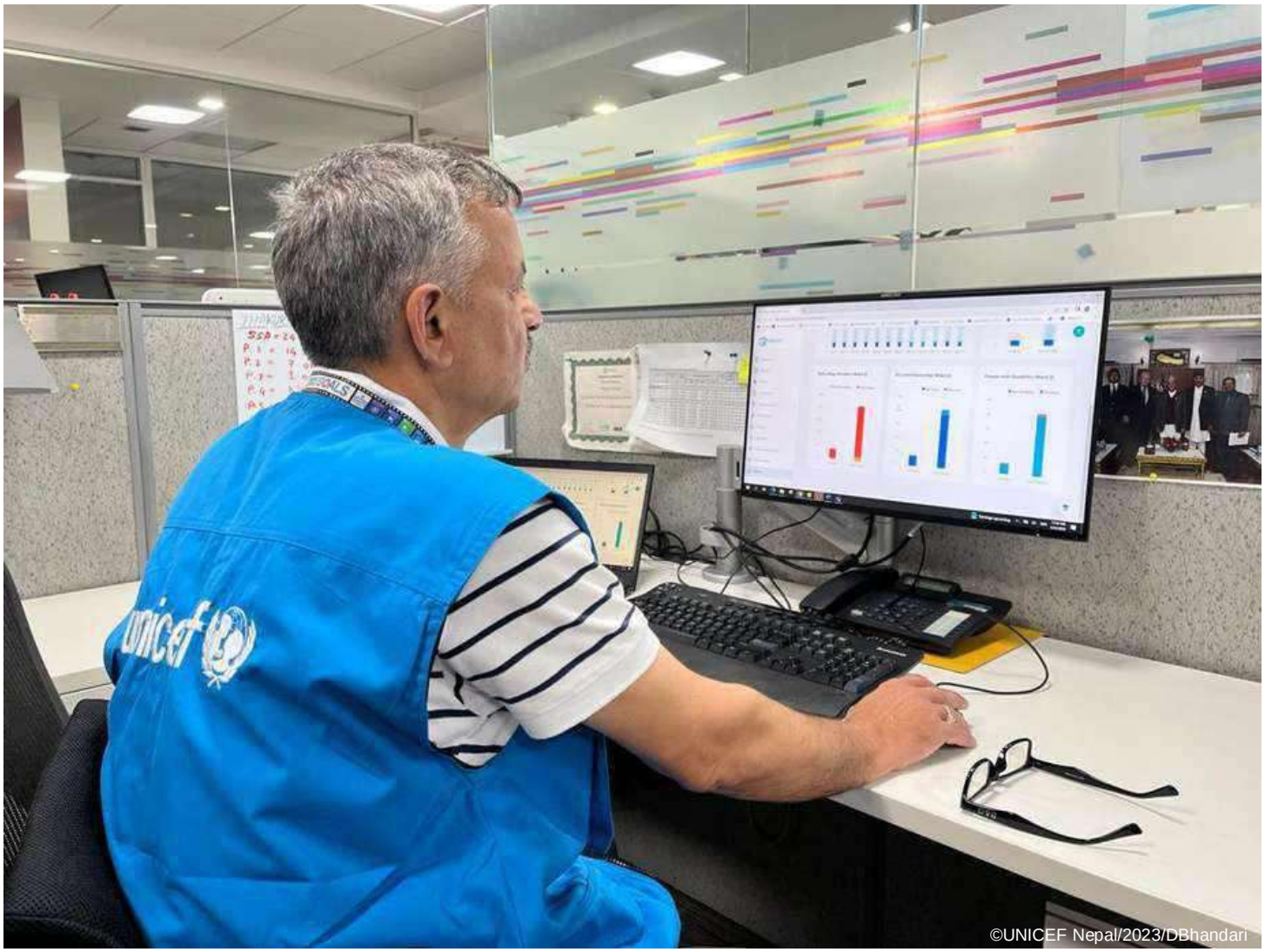


The Palika and ward authorities validated and approved the final beneficiary list, assigning digital tokens equivalent to the cash transfer amount through the Rahat dashboard. Once ready, both the Palika and UNICEF Nepal triggered approvals in their respective dashboards, initiating the fund transfer to the beneficiaries. This multi signature trigger was recorded in blockchain.

Beneficiaries with phones received SMS and automated voice recordings, notifying them about the aid, including information on where, when, and how they could access it. These beneficiaries then redeemed their tokens for cash from the assigned ward offices, facilitating a seamless and efficient distribution process.

Through real-time monitoring, the pilot achieved heightened transparency and efficiency, while leveraging automated and tracked reconciliation processes. This not only saved time but also promoted accountability and ensured the smooth execution of cash transfers.

By utilizing blockchain technology, the pilot harnessed the potential of distributed ledgers to revolutionize the cash transfer process. The transparency, security, and automation offered by blockchain enabled UNICEF Nepal, Palika, and beneficiaries to experience streamlined, accountable, and inclusive aid distribution.



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Objectives:

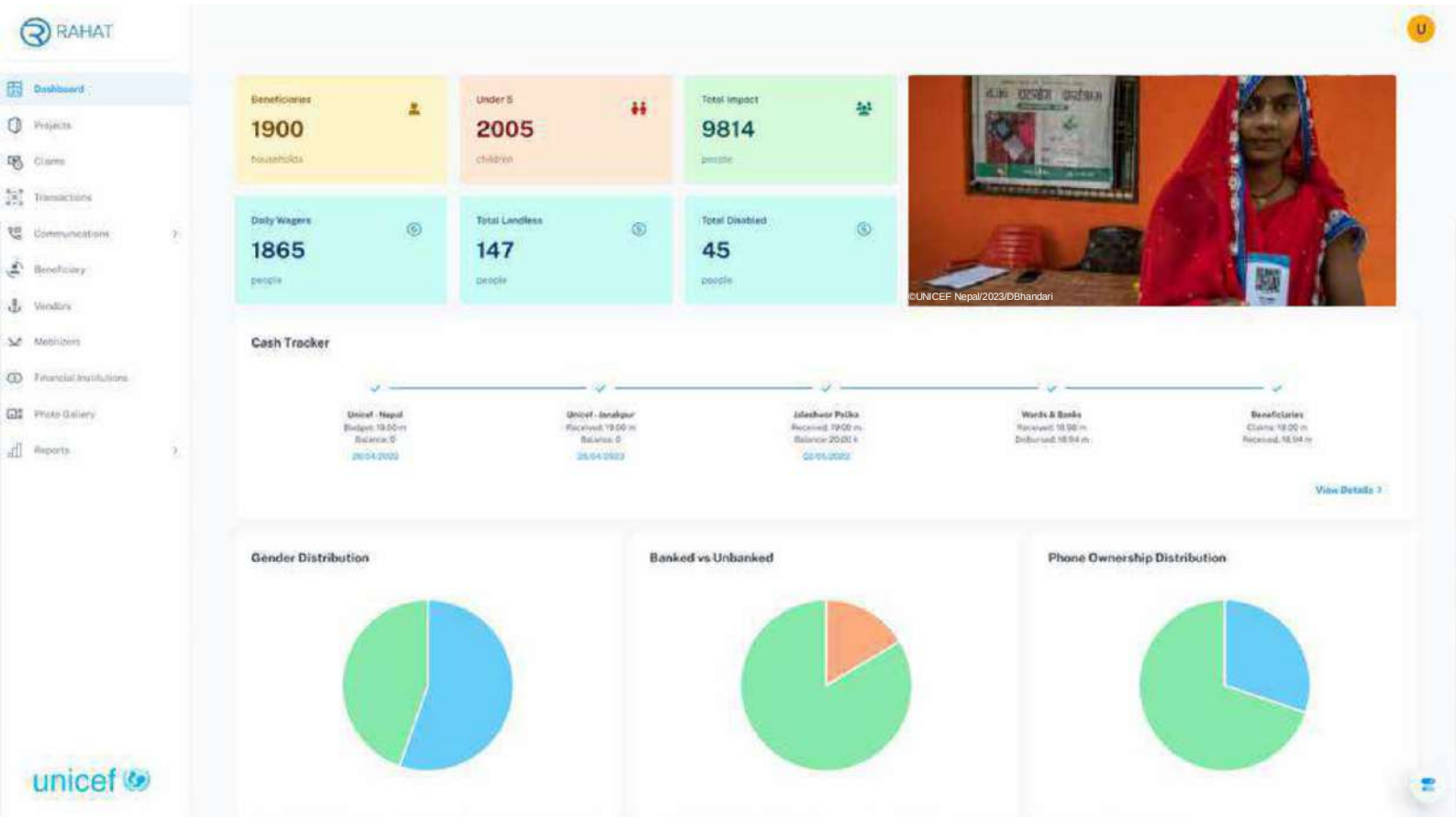
The pilot aimed to leverage Rahat's blockchain solution to revolutionize aid distribution, focusing on three key objectives: efficiency, effectiveness, and scalability. By harnessing the transparency and immutability features of blockchain, the pilot sought to transform the traditional digital Cash and Voucher Assistance (CVA) model.

Efficiency - Does Rahat help in faster disbursement of digital cash to the beneficiaries and minimize overhead for the implementers?

Effectiveness - Can the platform have a positive impact on the banked, unbanked beneficiaries along with the implementers - UNICEF Nepal and Palikas? Does the system improve accountability of fund movement?

Scalability - Does the technology have the capability to scale for wider adoption?

Through the pilot, the case study sought to address these objectives, paving the way for a transformative approach to aid distribution with blockchain technology.



Actions:

Rumsan adopted a collaborative approach in designing and implementing the Rahat pilot, working closely with key stakeholders including UNICEF Nepal, Palikas, and UNICEF Office of Innovation. The core strategy involved building upon the existing Rahat open source code base, while integrating other open source tools such as - Kobo Toolbox(an open source tool to collect, analyze and manage data) and Somleng(an open source voice and SMS system & a UNICEF OOI startup portfolio).

1. Analysis and Planning:

The Rumsan team conducted a comprehensive analysis of the existing processes and requirements in the field, in close collaboration with UNICEF Nepal and Palika. This analysis informed the development of various essential documents, including a work plan, concept note, pre and post-cash distribution flow, grievance handling, and Monitoring, Evaluation, and Learning (MEL) strategy. Based on the collaborative understanding, the existing open source Rahat platform and code repository were analyzed and planned to scale and improve.

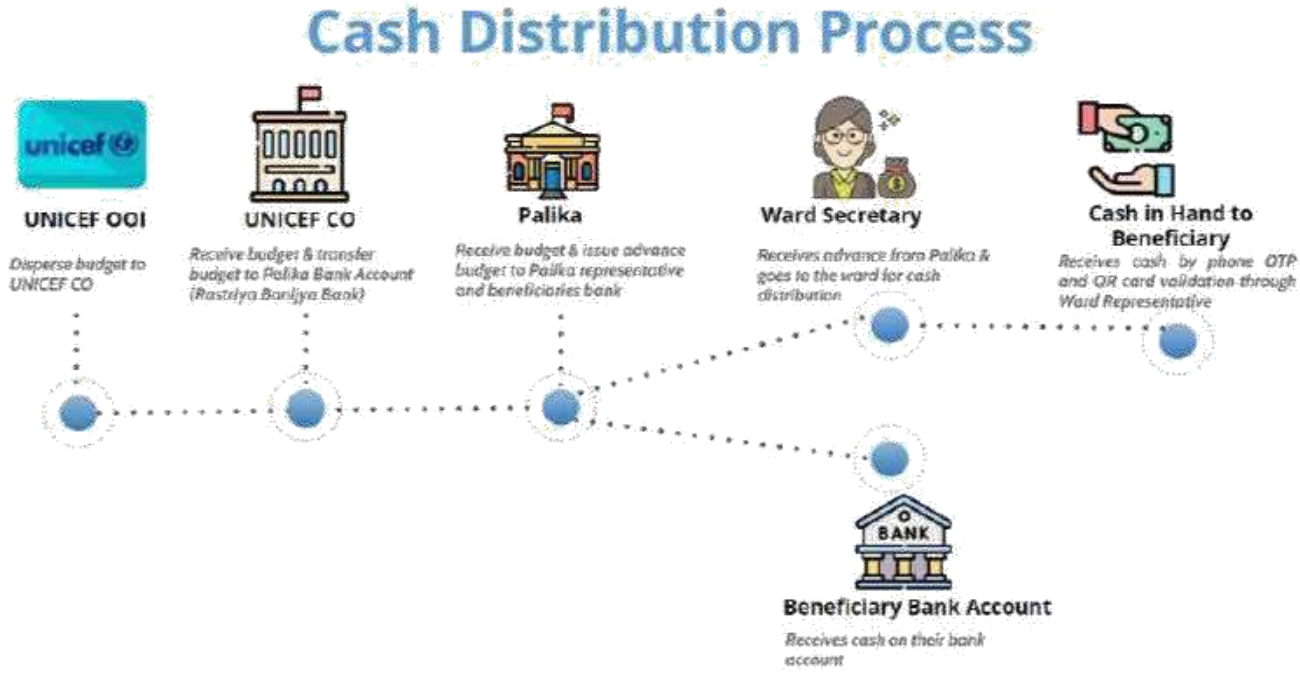
To enhance local support and engagement, Palika recruited local mobilizers who played a crucial role in data collection, verification, and providing assistance during cash disbursement.

2. Design and Development:

The creation of pilot cash flow distribution in Rahat was an iterative and inclusive process, where stakeholders redesigned aspects of the platform, presented it to users, received feedback, and continued to rework process flow. The focus was on creating an intuitive platform powered by blockchain to support CVA efforts digitally for banked and unbanked beneficiaries collaboratively with stakeholders and integrating other open-source tools to be used with Rahat.

Rahat implemented various essential elements to enhance accountability and transparency during the design of the blockchain for the specific pilot. As part of the Rahat ecosystem, a blockchain node was established for UNICEF Nepal to oversee their project and manage transactions. To verify the identity of participants within the blockchain, each stakeholder was provided with a custodial wallet service, enabling them to carry out transactions. A custodial wallet is a type of digital wallet that is managed and controlled by a third-party service provider (in this case - Rumsan). This provided added convenience and security for users who did not need to manage the technical aspects of storing and securing their digital assets themselves.

Additionally, the implementation of a multi-signature trigger ensured multiple layers of accountability throughout the entire process. The movement of funds was monitored using tokens, ensuring secure and traceable transactions. The flow of cash between stakeholders - UNICEF Nepal HQ, field office, Palika, wards, and beneficiaries - was confirmed through the signatures of each stakeholder, with the records being securely stored on the blockchain, thus guaranteeing the integrity of financial transactions. To ensure smooth operations, vendors and beneficiaries were allocated custodial wallets, and beneficiaries were able to interact with their wallets using their phones and QR codes. This approach empowered beneficiaries by granting them access to transparent financial services and actively involving them in the process. Rahat leveraged blockchain technology to introduce real-time reconciliation processes, enabling immediate and precise financial updates to be generated.



Beneficiary data collection and validation:

To gather beneficiary data, a team of 12 trained local mobilizers utilized Kobo Tool, collecting a total of 2,756 data entries. The mobilizers, along with Palika and the Rumsan team, worked collaboratively to validate the collected data. The Palika and local wards vetted the data and approved them as valid beneficiaries before token assignment. The approved data sheets were then integrated into the Rahat system, automatically incorporating the beneficiaries' information using API integration.

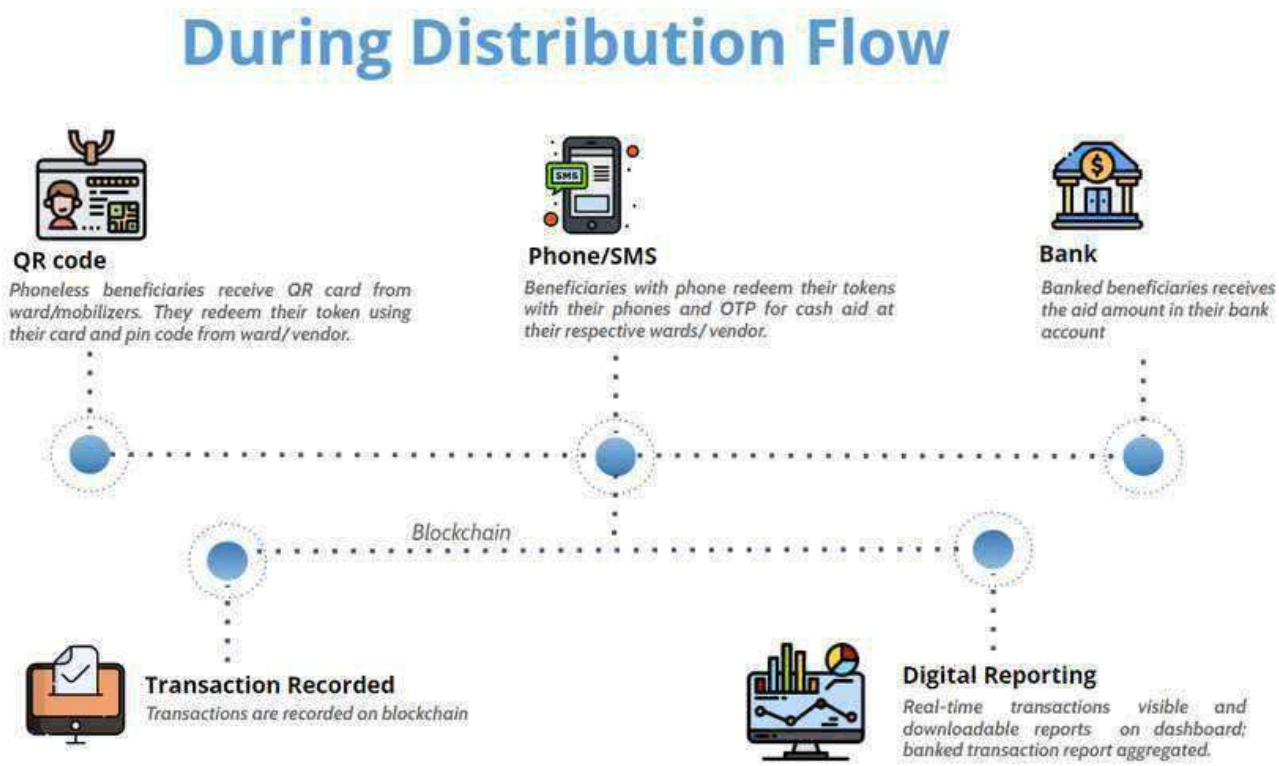
Beneficiary communication:

Unbanked beneficiaries with phones received notifications via SMS and IVR (interactive voice response). These notifications provided essential information about the distribution location and time for aid distribution. IVR functionality was introduced based on feedback from beneficiaries who faced challenges accessing and reading SMS features. Banked beneficiaries with phones received SMS notifications after the bank confirmed deposits.

The IVR functionality was integrated into the Rahat system through a partnership with Somleng. Rahat also provided comprehensive reporting on beneficiary communication, facilitating the tracking of the number of beneficiaries who received and listened to the automated voice recordings, allowing stakeholders to intervene and support as needed.

CVA mechanism:

The Cash and Voucher Assistance (CVA) program involved four primary stakeholders: supporting partner (UNICEF Nepal), implementing partner (Government bodies including Jaleshwor municipality, wards, and banks), local mobilizers and the beneficiaries. UNICEF Nepal generated tracker tokens and allocated them to Jaleshwor municipality through the Rahat dashboard. We developed custodial blockchain wallets for every beneficiary, which were linked to their mobile numbers or designated QR codes. Once the beneficiary data was verified and approved, the Palika assigned tokens to the beneficiaries' wallets.



For Banked Beneficiaries:

For beneficiaries with bank accounts, the Palika assigned tokens and coordinated the transfer of funds directly to their respective banks. As banks did not have open APIs, the reporting process involved a manual procedure to update within the Rahat dashboard. Once the Palika received the bank deposit confirmation email, they forwarded it to the Rahat team. The Rahat team then verified and recorded these transactions on the blockchain using the unique transaction IDs provided by the bank, ensuring the integrity and accuracy of the financial transfers.

For Unbanked Beneficiaries:

To facilitate the distribution of tokens to unbanked beneficiaries, the tokens were transferred to the local wards responsible for managing the distribution process. The wards utilized QR cards or OTP verification to exchange the tokens with the beneficiaries. These verified transactions were securely recorded on the blockchain, ensuring transparency and accountability.

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3. Deployment and Implementation:

During the deployment phase, the Rumsan team closely supervised and participated in the implementation of the Rahat system, working alongside stakeholders and end-users to ensure a seamless transition. Local team coordinators played a vital role in documenting and troubleshooting any issues that arose during the implementation process.

Dashboard Setup and Onboarding-

The system's dashboard was set up to onboard various stakeholders, including UNICEF Nepal, UNICEF OOI, and Palikas. To ensure secure access, a blockchain wallet was utilized for login authentication. The dashboard provided real-time monitoring of transaction data and included robust reporting tools to facilitate effective decision-making. Overall, the dashboard served as a comprehensive solution for tracking token and fund flow, beneficiary communication, and vendor transaction activities.

Capacity Building-

To enhance the capabilities of the project staff, specialized in-person training sessions were conducted for social mobilizers on the Rahat ecosystem. They were equipped with the necessary skills to utilize Kobo-collect for data verification and to handle grievances effectively. Both online and in-person training sessions were organized for UNICEF Nepal and Palika members, ensuring their proficiency in utilizing the Rahat dashboard. Physical training sessions were also conducted for Palika, ward members, and social mobilizers to familiarize them with the Rahat vendor application.

Grievance Handling Mechanisms-

Comprehensive mechanisms for handling grievances were developed, taking into account both technical and non-technical challenges and risks that could arise during the pilot period. This proactive approach ensured that potential issues were addressed promptly and effectively, enhancing the overall user experience.

Communication of relief distribution to beneficiaries-

Various visibility collaterals, such as leaflets, SMS messages, and OTP messages, were developed to raise awareness among beneficiaries. Local mobilizers distributed these collateral to beneficiaries through door-to-door visits or phone communication, and in certain cases, during cash distribution events. Interactive voice response (IVR) messages were sent in the local language, Maithili, to facilitate effective communication.


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Key Findings:

The Rahat platform gathered transactional data, as well as project and beneficiary details. Additionally, technical and non-technical data were obtained through end-user surveys, Key Informant Interviews (KII), and observations of the system to explore key questions on efficiency, effectiveness and scalability of Rahat platform. *UNICEF Nepal has engaged an external Monitoring and Evaluation (M&E) company to perform an in-depth analysis and conduct a comprehensive evaluation of the pilot project.*

Efficiency-

To assess the efficiency of Rahat in the pilot, we closely monitored the time taken for various processes, including end user onboarding, cash distribution, transaction confirmation, and validation. This monitoring allowed us to evaluate the overall speed and efficiency of the Rahat system in facilitating these crucial steps in the CVA workflow.

End user onboarding:

Social mobilizers efficiently collected an average of 25.51 data entries per day using Kobo Tool, resulting in a total of 2,756 data entries.

Unbanked beneficiary cash distribution: The vendor app usage facilitated quick transactions, averaging within 2-3 minutes. OTP transactions were even more efficient, taking only around 28 seconds.

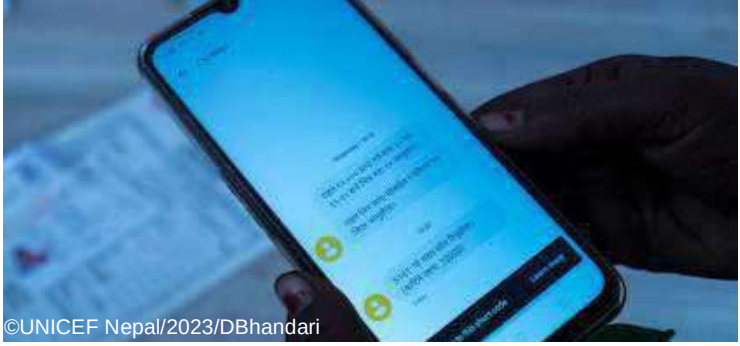
Streamlined administration of aid distribution:

Interviews with municipality staff, Nitesh Chaudhary and Rakesh Paswan, revealed that it took 1-2 administrative days to distribute cash to unbanked beneficiaries and approximately one week to transfer cash to banked beneficiaries. This highlights the potential for streamlined and faster aid distribution when beneficiary lists are prepared in advance.

Fast transactions:

The average completion time for cash distribution for beneficiaries - which involves sharing phone numbers or scanning QR cards, as well as the OTP verification process - was under 5 minutes; while blockchain transactions were between 4 to 8 seconds. Unbanked beneficiaries with phones received their OTP in approximately 28 seconds, ensuring timely and secure transactions. These findings highlight the efficiency of the Rahat system in facilitating crucial steps in the CVA workflow.

> "The cash was distributed directly to the intended recipient, leaving no possibility for anyone else to claim the money. Upon receiving a message on our mobile devices, we were able to promptly proceed to the office and collect the cash."
>
> *- Rakhi Kumari Mandal, Beneficiary*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Effectiveness-

To assess the effectiveness of the Rahat platform, we evaluated user experiences of both beneficiaries and implementers.

Platform for inclusive CVA project management:

The Rahat platform provided a secure and inclusive way for enrolled beneficiaries to claim their aid without identity issues. Unbanked beneficiaries without phones successfully used QR code cards, ensuring a structured cash collection process that promoted convenience and inclusion. This approach addressed challenges faced by unbanked individuals without mobile phones or bank accounts, providing them with an organized means to access funds.

Real-time tracking in the dashboard:

The Rahat dashboard enabled real-time monitoring of the cash distribution process from anywhere in the world. Thakur Dhakal, Social Policy Specialist at UNICEF Nepal, highlighted the increased insight gained through real-time data and tracking of aid distribution. “It is now possible to monitor the cash distribution process in real-time from anywhere in the world. We can keep track of the number of beneficiaries who have received the cash and the total amount that has been distributed thus far. The real-time information is readily visible on the dashboard, ” Dhakal said. The dashboard displayed information such as the number of beneficiaries who received cash and the total amount distributed, enhancing transparency and accountability.

Experience with SMS/IVR:

A total of 1,327 beneficiaries were successfully notified through SMS, with 1,078 banked and 249 unbanked individuals. Although 36.63% experienced IVR message failures due to mobile network issues, lack of balance, or migration, beneficiaries expressed confidence in receiving cash through SMS/IVR notifications.

Rakhi Kumari Mandal, an unbanked beneficiary said, “The cash was distributed directly to the intended recipient, leaving no possibility for anyone else to claim the money. Upon receiving a message on our mobile devices, we were able to promptly proceed to the office and collect the cash.” Unbanked beneficiaries with access to phones found the process of redeeming their cash prompt and convenient, ensuring a more informed and dignified experience of redeeming their cash at their will with their feature phones from participating vendors.

Experience with QR code cards:

In cases where beneficiaries did not have access to phones, they were assigned QR code cards. These beneficiaries were provided with QR cards to facilitate the aid transaction process. QR code cards were preferred by 71.43% of beneficiaries, demonstrating their acceptance and usability despite limited knowledge.

Financial inclusion:

The project served 1,900 households, including 249 unbanked individuals who gained access to financial services. 1,588 households with existing banking access were supported for comprehensive reporting. The project aimed to uplift those most affected by the pandemic, promoting financial inclusion, enhancing livelihoods, and fostering inclusivity. The Rahat platform effectively facilitated project management for Palikas and UNICEF Nepal, enabling efficient monitoring and supervision of the project.

Scalability-

To evaluate Rahat's scalability, we assessed its compatibility with open-source tools, operational challenges and its potential for future projects with offline transactions to scale in remote areas, as recognized by stakeholders.

Somleng and KoboTool Integration:

The pilot project revealed the scalability of the Rahat platform through use of open-source products like Kobo Toolbox and successful integration with Somleng. Manjik Shrestha, Lead Blockchain Developer, Rumsan, estimated that reusing code saved almost two weeks of development for his team, showcasing the potential for future projects. The seamless API integrations further enhanced the platform's scalability and compatibility with other systems

Offline modules:

To overcome operational challenges of SMS delivery and IVR communication, an offline Rahat vendor application was utilized, enabling smooth transactions even without network access. The application recorded transactions on the blockchain once online, ensuring data integrity. IVR lowered the overall logistical strain of communicating with beneficiaries - the gap of IVR delivery failures were met with engaging local mobilizers and ward members. And for beneficiaries who missed bringing their registered mobile devices (8.9%), their transactions were completed with the help of back-up PINs that had been prepared for such grievances.

Future use-case:

UNICEF Nepal and the municipality effectively utilized the Rahat dashboard, while ward members used the vendor application. Mobilizers were trained to use KOBO and the vendor application, with support as required. Positive feedback was received from ward members who found the vendor application user-friendly and beneficial for accountability and reconciliation. Nitesh Chaudhary, a user of the Rahat dashboard, praised its user-friendly interface and informative content. He recommended introducing the platform to other municipalities, leveraging the success of Jaleswar as an example. He also highlighted the need for dedicated IT staff to be present in orientation. Nitesh expressed confidence in his ability to efficiently navigate and utilize the platform for future projects, thanks to his familiarity and previous experience.

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Lessons learned and Recommendations

Throughout the pilot, numerous opportunities that have the potential to further enhance Cash and Voucher Assistance (CVA) initiatives were identified. These insights have been distilled into actionable recommendations based on discussions with key stakeholders.

1. Reusing and improving existing tools proved to be a cost-effective and time-saving approach. By leveraging the code base of Rahat and integrating with open source tools like Kobo Toolbox and Somleng, we streamlined processes and reduced development efforts. However, lack of integration with the banking system (due to which we had to reconcile banking transactions manually via email reporting) caused delays. Therefore, whenever we use local currency, we recommend partnering with banks for API integration to ensure real-time verification of bank transactions on the blockchain. This will enhance accountability and transparency and support the overall comprehensive reporting for donors and partners.

2. To enable scalability, Rahat is designed to be interoperable through REST APIs. However, challenges with mobile networks presented obstacles for IVR communication and SMS delivery. To overcome these limitations, offline modules were implemented for data recording and asynchronous transactions. While this approach compromised real-time tracking, it ensured data integrity and transaction accuracy. Therefore, to facilitate adaptability of Rahat platform, it is advisable to keep the development of the platform simple, flexible, and modular so it can work independently or together and can be easily adapted in the future. The platform can be tailored to suit diverse environments and requirements. Additionally, when planning to scale the Rahat platform to regions with low bandwidth, it is recommended to consider the inclusion of a tool that supports offline functionality.

3. Effective utilization of existing beneficiary data proved challenging. Rahat platform becomes effective, as long as beneficiaries data are accurate. Collaborative meetings were held to address data validation obstacles, including duplication and final data approval confusion. To streamline this process, we recommend prioritizing the need for timely sign off of the latest endorsed data from the municipality as well as mobilizer and ward alignment to avoid conflicts and or considering third-party validation services. Once the information is verified, beneficiaries can be enrolled into the system and cash transfer is seamless.

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4. Beyond technology management, successful cash transfer processes relied on strong engagement and management of Palika and ward members for beneficiary data approval and validation. Delays were encountered due to gaps in managing local stakeholders' schedules and competing priorities. To address this, we recommend budgeting and/or engaging a dedicated local resource or consultant to manage in-field communications, either from a third-party organization or within the aid organizations involved. Building an incentive mechanism for accuracy and timely vetting and delivery of beneficiary data may help this process.

5.During the pilot project, blockchain technology was utilized to issue, record, and verify token transactions. To ensure scalability, it is crucial to explore other potential use cases for blockchain in the context of Rahat. One such use case is the maintenance of digital identities, which can enhance the security and interoperability of beneficiary enrollment. By leveraging blockchain for digital identity management, Rahat can establish a secure and reliable system that ensures the authenticity and integrity of beneficiary information, enabling seamless collaboration and data sharing among different stakeholders.

6. Blockchain is a novel technology. Understanding the value provided by this technology, such as immutability (which could translate into accountability) and transparency by primary stakeholders (like Palika members) will help in the adoption of Rahat Platform. As we implement projects like these, it would help to bundle education and training programs on the value proposition of the technology and different ways it can be utilized.

By incorporating these recommendations, future implementations of Rahat and similar initiatives can benefit from improved efficiency, scalability, and stakeholder engagement, ultimately enhancing the impact of humanitarian aid efforts.