# Insurance Automation by Lead Foundation in Egypt

1. DEVELOPMENT RELEVANCE

Economic and poverty context

According to the World Bank, the economy in Egypt is gradually improving with the annual rates of GDP growth reaching 4.3% in 2015/2016. The overall budget deficit declined in the first half of FY17 to 5.4% of GDP, down from 6.4% in the same period in 2018. Still, over a quarter of the population lives below the national poverty line. While important fiscal reforms are taking place, record high inflation continues to be a major concern. The Central Bank of Egypt (CBE) has tightened monetary policy and the Government has increased spending on social protection to mitigate the impact on living conditions.

Table 1: Population and economic indicators	
Population in million (*2015*)	**91.51**
GDP growth (*2016*)	**4.3%**
Inflation (*2016*)	**13.8%**
Trade balance (% of GDP) (*2012*)	**-9.3%**
Foreign direct investment (net) (% of GDP) (*2016*)	**2.4%**
Net ODA received (% of GNI) (*2015*)	**0.8%**
Remittances received (% of GDP) (2016)	**5%**
Economic Freedom Index (Rank among 186 countries) (*2017*)	**144**
Poverty indicators	
GDP per capita (USD) (*2016*)	**3,478**
Gini Index (0= equality 100= inequality) (2015)	**31.8**
International poverty rate (*2015*; at 1.90 USD/day)	**1.4%**
National poverty rate (*2015*)	**27.8%**
National rural poverty headcount rate (*2010*)	**32.3%**
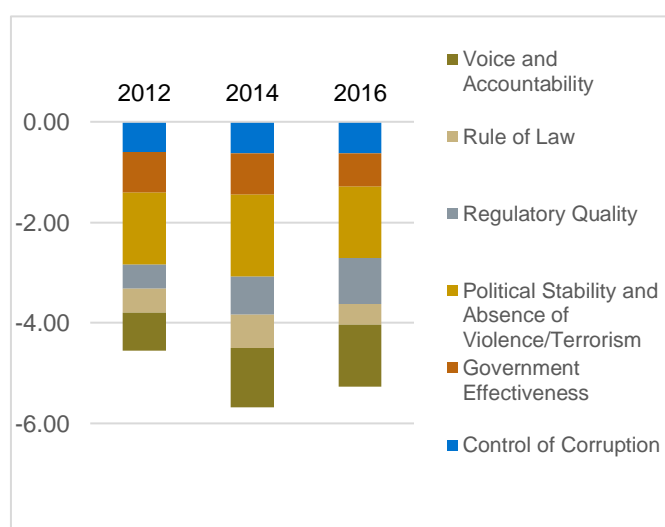
Governance indicators chart[i], *(Egypt, 2012 - 2016)*

Financial sector context

Only 14% of the total population and 9% of adult women in Egypt have access to a bank account, leaving nearly 18 million women without access to formal financial services[ii].

Insurance penetration (ratio of total premium to GDP, an indicator of the maturity of the insurance sector of a country) in Egypt is at 0.64% (world average is 6.28%), and insurance density (premium per capita, an indicator to understand how much a person spends on insurance) is USD 22.8 (world average is USD 638.3[iii]). Government social health insurance does not cover the informal sector population, most of which are low income women. As a result, Egyptians end up using more expensive private healthcare facilities and pay 90.6% of their health expenses out-of-pocket. Commercial insurers in Egypt have focused on the middle-class segment and have not yet expanded offerings beyond credit-linked life insurance for the low-income segment.

The Government of Egypt is pushing key reforms to promote financial inclusion. FRA (Financial Regulatory Authority for Insurance and MFI) is committed to strengthening the regulatory and legal framework for the microfinance sector. In 2019, in an effort to improve access to insurance, FRA established a mandatory credit-life insurance for death and disability on micro-loans for all microfinance institutions. Despite good intention, the results remain to be seen as this cover will provide more protection to the institutions rather than their customers.

Partner financial institution/s:

The mission of Lead Foundation ("Lead"), a not-for-profit microfinance institution, is to provide poor and low-income entrepreneurs, especially women, with sustainable access to quality microfinance services that address their needs and build their capacity. With 18 branches and two satellite offices, Lead offers group and individual loan products (GL and IL, respectively)

as well as hospital and life microinsurance on every loan. As of December 2017, Lead had an outstanding portfolio of EGP 294 million (CHF 15.44 million) and 191,794 active clients[1], of which 88 percent are women. 100 percent of GL clients are women clients, while 53 percent of the IL clients are women. The average loan size IL clients is CHF 330[2], while that for the GL clients is CHF 146[3]. Lead has been a member of the Women's World Banking network since 2003. For the last five years, Women's World Banking has been intensively supporting Lead on credit, insurance, and leadership programs.
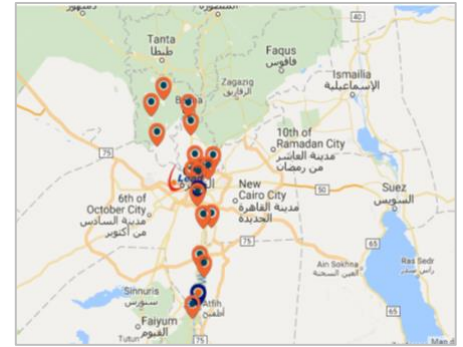
2. INTERVENTION APPROACH

Capacity building needs

FIGURE 1. MAP OF LEAD'S BRANCH LOCATIONS

The main motivation for this work was based on two observations in January 2018:

- Based on feedback received in the course of our previous project 2016-07 from Lead's customers, the level of product satisfaction was high. However, the time taken by Lead to pay claims was a source of stress for women. At the start of the project, 67 percent of small value claims (claims for up to 5 nights) were processed in 10 days;
- With the new development of a family policy (under contract 2018-03), the overall number of claims was expected to surge due to family members. In order to maintain an efficient process, Lead would have to increase the productivity of their staff and become less and less manual.

The project was designed to reduce the claim turn-over time through the implementation of technology and scaling of the artificial intelligence (AI) fraud model developed and tested in a previous project funded by Visa. The main capacity building opportunity was to improve Lead's ability to implement the AI fraud model in their system and to systematically track claim turn-around times.

Project approach

The original project objectives can be explained through the following graphs:
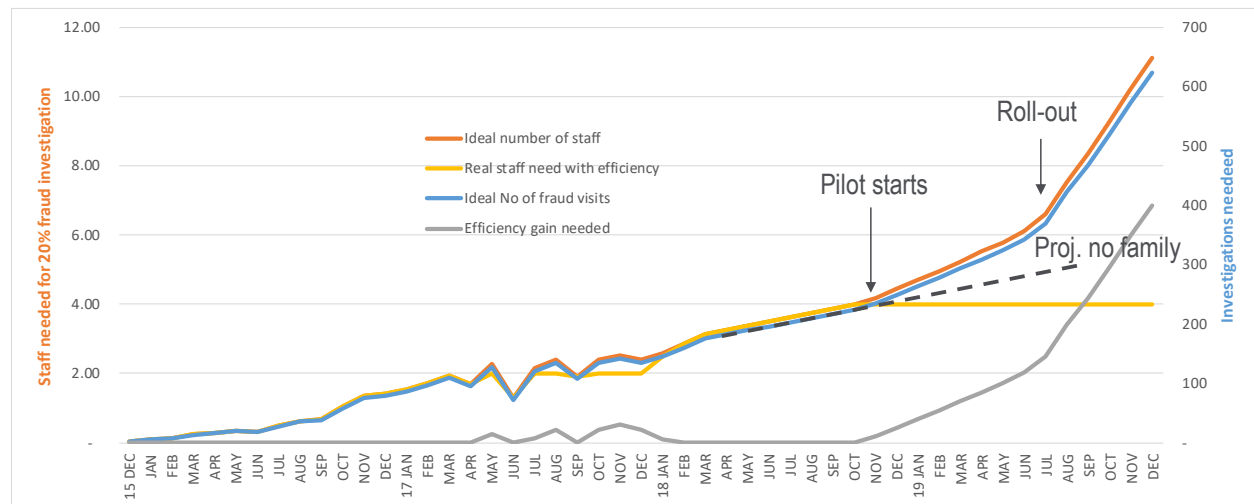

FIGURE 2 PROJECTION OF EFFICIENCY IMPROVEMENT NEEDS

- Without efficiency improvement and launch of the family policy, the team size would grow disproportionally;
- The orange curve (left axis) shows the ideal number of staff for a 20 percent investigation rate;
- The blue curve (right axis) shows the nominal number of investigated cases;
- The grey curve (right axis) shows the efficiency gain necessary;
- The yellow curve (left axis) shows the real number of staff needed including efficiency gains.

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1 Includes about 3% clients who are in arrears and hence are not covered under the insurance program

2 Value on Sept 1 2016: CHF 664

3 Value on Sept 1, 2016: CHF 320

Based on original planning, Women's World Banking procured a FinTech start-up, whose technology capabilities would ultimately drastically reduce the turn-over times and would be able to replicate the existing fraud robot. This approach had to be revised during the project due to three main reasons: a) Lead had invested a significant amount into the development of their IT system and the FinTech was only able to provide support if the system was migrated onto their on-line platform. b) Due to increased competition in the market, Lead felt that sharing (even partial) information with the FinTech would ultimately erode their competitive advantage in providing microinsurance. c) The latest phase of testing with the fraud model revealed various human barriers that could not be overcome and are laid out below in this report. Women's World Banking proposed a different approach to reach the objectives. The project team terminated the FinTech contract and implemented IT capacity building measures within Lead.
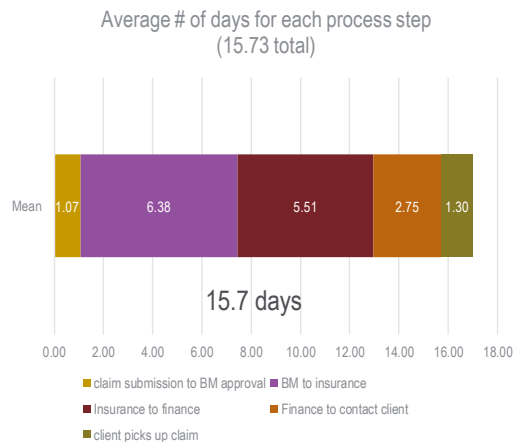

Average # of days for each process step (15.73 total)

Mean 1.07 | 6.38 | 5.51 | 2.75 | 1.30

15.7 days

0.00 2.00 4.00 6.00 8.00 10.00 12.00 14.00 16.00 18.00

■ claim submission to BM approval ■ BM to insurance
■ Insurance to finance ■ Finance to contact client
■ client picks up claim

FIGURE 3: CLAIMS TURNAROUND RATE AT PROJECT START

Scanner, reviewed process and visualization:
The team analyzed the time stamps from the existing IT system to methodically identify process sub-steps (See Figure 3). Bottlenecks were identified in duplicated control steps (e.g. Branch manager sign-off, or finance redundant approval). Thanks to the original IT system set-up, the team was able to split the turn-around time and visualize it manually. At that point, it became clear that visualization was key to improve performance. In order to be able to maximize the time available to review the paperwork, a scanning approach was designed, in which the administration officer would scan the discharge forms and send them to the central insurance team for review. This system was built between June 2018 and December 2019. Based on these adjustments, the performance of total turn-around time was drastically improved from 15 days to just 8 days in September 2018.

Visualization:
Lead foundation faced two challenges with regard to tracking turn-around;
- Display turn-around times accurately as in Figure 3 in excel requires a lot of manipulation;
- While average gives some indication of turn-around time, 80_{th} percentile is more appropriate. Based on the Pareto principle (also known as the 80/20 rule), it is possible to improve the efficiency of 80% of cases with a reasonable effort, while the remaining 20% will require fundamental changes.

Consequently, Lead was trained several times on the concept of what the team called the Q-Quantile or 80_{th} percentile (i.e. maximum turn-around time of 80 percent of cases) and the P-Quantile or percentile at which a claim needs more than 30 days to be paid (for which we set a target of 2 percent).
In tandem, the team started to develop a visual interface on Power BI © to help the team steer the business.

Fraud model:
The team had been planning to replicate the existing fraud model. However, as mentioned above in point C under the Original Project Approach section, the team had to explore a new approach for the following reasons:
After the second round of testing from January and April 2018, a critical barrier was identified with regard to applying the fraud model / While developing the fraud predictive model, the team discovered that developing artificial intelligence would present four key challenges;

- Obtaining the right data points and cleaning them to the right quality level
- Finding the right balance between accuracy (right correlations) and complexity of the model
- Limitations based on timing and project scope
- Difficulties with change management and organizational cultural buy-in

While the first three hurdles could be overcome with some effort, the final challenge caused the team to change the approach and replace the model by a score. Because the machine learning model solely analyzes quantitative data, as opposed to pairing the analysis with qualitative review conducted by team members, the model also overlooked obvious cases such as stamp tampering, overwriting the discharge days or fake hospital names. While the model recognizes more complex correlations between the various data points available such as number of days, loan term, disease, age, repayment term, it provides a binary score 0-1. 0 meaning no fraud, 1 meaning fraud. However, for a human being, detecting fraud is much subtler and less binary, it involved exploring inconsistencies and intuition, checking for complex human-behavioral details that cannot be mirrored in an algorithm within the model. Consequently, the local team did not trust the model as a co-worker to help prioritize work and another approach described below was taken.

3. RESULTS ACHIEVED AND NOT ACHIEVED

Turn-around Time (TAT) improvement (over-achieved):
Improvements regarding turn-around time are a true highlight of this project. Not only were the turn-around reduced, but 50% of the claims are paid immediately thanks to branch scans and a revised process. Typically, the client waits in the branch and collects the payment immediately, visible in the chart below;
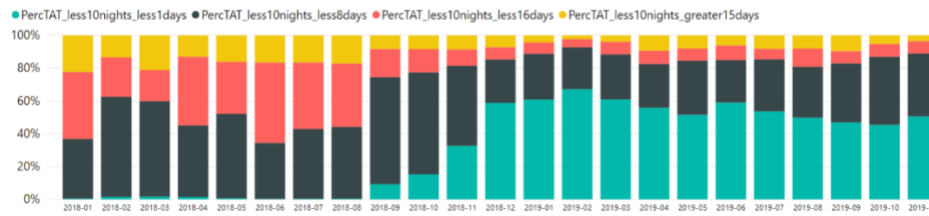
SCBF

TAT <= 10 nights

FIGURE 4 - IMPROVEMENT OF TURN-AROUND TIMES

TAT <= 10 nights (50 % and 80 %)

FIGURE 5 TURN-AROUND TIMES - 80TH PERCENTILE AND 50TH PERCENTILE (MEAN)

This reduction in turn-over can be attributed to following factors:
- Estimate of 5 days through the shorter scanning process (removing branch manager paper sign-off, and allowing the central team to start work on the digital copy). This was possible due to the classified format of discharge forms and the head office team experience;
- Additional 2 days attributable to introduction of claim check-lists and structured review of discharge forms (if the discharge form meets all criteria, the claim can be paid on the spot) with specific suspicion fields in the data base;
- Estimate of 3 to 5 days through removal of redundant finance sign-off (while keeping reconciliation controls).

Fraud score (achieved):
To overcome the human resistance on the fraud model and improve the process efficiency, the team created and iterated a set of intuitive fraud rules that allow to analyze all claims in a consistent manner. The rules contained principles such as: Has this client already filed a claim? How long has this client been a customer of Lead? Has the client a chronical disease etc. Those criteria are summarized in simple scores to support Lead Foundation with ranking claims and review priorities. The rules were calibrated based on the real fraud detection and are meant to offer an automation and allow to compare with their own suspicion.

Rule1	Rule2	Rule3	Rule4	Rule5	Rule7	Rule8	Rule9	RuleSum	Loan_Date	Discharge_Date	Claim_Amount	Team Suspicion_1
1	0	0	0	0	1	1	0	3	12/18/2018 12:00:00 AM	10/23/2019 12:00:00 AM	6600	Discharge date
0	0	0	0	1	1	0	1	3	9/24/2019 12:00:00 AM	10/25/2019 12:00:00 AM	1200	
1	0	0	0	0	0	1	1	3	5/20/2019 12:00:00 AM	11/15/2019 12:00:00 AM	9600	
0	0	0	1	0	0	0	1	2	7/18/2019 12:00:00 AM	10/26/2019 12:00:00 AM	2100	

FIGURE 6 FRAUD VISUALIZATION

In Figure 6, the first claim has three rule criteria met and the team has one suspicion on the discharge date, the two following claims have also three rule criteria met but none was identified as suspicious, so team can prioritize the third claim with a value of EGP 9,600 to verify further.

E-payments (not achieved / delayed):
As part of process improvements, Lead and Women's World Banking originally agreed on a digitization of payment that would involve an e-wallet or Fawry, as a local provider. As the project progressed and more than 50% of claims were paid on the spot, the need to provide payment electronically reduced substantially in the course of the project and was ultimately deprioritized against electronic loan repayments.

The agreed approach that will be tested after the end of the project is as follows: all claims that are not paid on the spot in the branch and are for 3 nights or less will be collectable through Fawry. This approach is the result of financial analysis with a 0.7% cost of the total digital transfer. The cost for Lead to pay one claim (time administration, cashier, account) is estimated at 12.5 EGP based on a financial tracker. For claims up to 5 days 0.7% is cheaper that Lead's real costs and with the cost of transportation to the branch estimated between 8-12 targeting those smaller claims make sense. A process was developed with phone number and code to make sure there is no risk that someone else collects the money.

Client level

Client profiles – *Woman client with multiple claims*

FIGURE 7: SALWA MAGDY HASSEN

Salwa Magdy Hassen sells utensils and changes gas cylinders for work and received a loan from Lead Foundation to purchase goods for her business in order to increase her income. She borrowed money from her brother so that she could deliver her baby in hospital and applied to receive insurance from Lead Foundation so that she could pay back the money borrowed from her brother. She said, "The insurance of Hemayat Lead is very good because it has compensated me for the time I closed my business for delivery." Lead paid Salwa on the same day thanks to the new process.
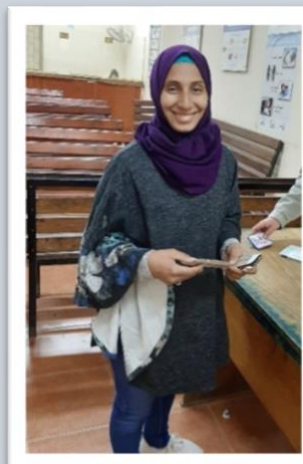

FIGURE 8: INAS ABDO ABDUL MAGUID

Inas Abdo Abdul Maguid sells clothes and applied for a loan with the Lead Foundation in order to grow her successful business. She visited the hospital because she was experiencing stomach problems and paid for her visit from revenue from her clothing business. She said she planned to use the Hemayat Lead Insurance in order to pay for household expenses and was pleased that she was able to get her insurance money within a day. She said that "the insurance system is excellent and that she is very satisfied about the service provided in the branch."

Partner financial institution level

Key performance indicators of the program

Indicators (in days to pay)	Before project	Mar 2018	June 2018	Sept 2018	Dec 2018	Nov 2019
80th percentile claims <=10 nights	15	13	13	8	4	4
Mean of claims <=10 nights	7	7	9	4	1	1
% of claims <=10 nights turned over in > 30 days	11.5%	5.15%	8.18%	1.45%	3.75%	1.62% (at Oct 2019)
% of claims <=10 nights turned over in <=1 day	0%	0%	0%	10%	61%	52%
e-payments	n/a	n/a	n/a	n/a	n/a	n/a
% of claims > 10 nights turned around in <=16 days	24%	24%	3.85%	27%	56%	75%

It should be noted that the June 2018 score for claims > 10 nights is mainly due to lower processing times during Ramadan – in which modified working hours for all partners apply. This element is now monitored cautiously by Lead Foundation.

4. LESSONS LEARNT

The main lessons learnt from this project are:

- Use technology in the right balance in a transforming process: Using technology to speed up the process works where bottlenecks have been identified. Ready to go end-to-end technology solutions are often more difficult to implement due to human factors.
- Intuitive measures like average and count are counter-intuitive for operational efficiency. Using quantiles as the right measuring stick requires continuous training.
- Visualization alone does not work to increase efficiency. The process of developing a visualization and identifying / concentrating on steps that take too much time is equally important.

i The World Bank Group (*2012-2016*). Worldwide Governance Indicators database. Washington, DC. http://databank.worldbank.org. Accessed (*January 2018*)

ii 2014 World Bank Global Findex

iii Swiss Re Institute (*2017*). World Insurance n 2016: The China growth engine steams ahead. Retrieved from https://www.tsb.org.tr/images/Documents/Teknik/sigma3_2017_en.pdf