Localized Big data applications for supporting decision making:

COVID19 CASE
Lebanon and Jordan

15 December, 2020

CODE (council of development and ethics)

Members from local Stakeholders and Academia Responsibilities include providing counsel, advice and input on:

- relevance of the project
- methodologies and data sources for meeting set objectives;
- ethical questions and concerns raised by the project;
- appropriateness of the system to respond in emergency contexts;
- appropriateness of data protection measures and security measures for data subjects;
- ways and means to enhance the project’s scope, visibility and outreach to relevant groups;
- opportunities to engage concerned government agencies, organizations and civil society;
- recommendations for possible extension, application and improvement of the project.
I. Project

Evaluate the effectiveness of a set number of government policies adopted to respond to the crisis and mitigate its effects on the populations, with a particular emphasis on using alternative sources of data in evaluation.

Questions:

1. Under crisis pressure, which governmental decisions are most relevant to track?
2. Who are the owners, stakeholders, and target beneficiaries of each policy?
3. What are the activities, outputs, outcomes, and impacts of each policy?
4. What are the indicators that measures performance of change?
5. What are the available data sources for each indicator?
6. What are the motivational logic for each nontraditional data source?

National Policy Selection Criteria: Score 1 to 5

1. How Relevant is policy measure of interest?
2. What is Level of ambition & scope?
3. Who are Target populations of interest? The most vulnerable/deprived in society?
4. What is the Extent of coverage of the policy
5. Are the policies operational to assess their impact?
6. How far is there available and accessible data (traditional & non-traditional) which allows for the effectiveness evaluation of policies?
7. How far does the policy relate to SDGs of interest and/or of priority?
### Selected policies for Lebanon

<table>
<thead>
<tr>
<th>No</th>
<th>Category</th>
<th>Policy description and its significance</th>
<th>Initiating ministry / Policy owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB1</td>
<td>Cash transfer / Food distribution</td>
<td>Social solidarity program within the social emergency plan to address the repercussions of the Coronavirus</td>
<td>Ministry of Social Affairs</td>
</tr>
<tr>
<td>LB2</td>
<td>E-learning</td>
<td>Hybrid model of return to schools: e-learning and presence</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>LB3</td>
<td>Support to SMEs (private sector)</td>
<td>Intermediate Circular No. 547 related to granting exceptional loans to customers who were unable to pay their payments and dues during the months of March, April, May and June 2020 due to the Covid-19 crisis</td>
<td>Banque du Liban</td>
</tr>
<tr>
<td>LB4</td>
<td>Disaster response</td>
<td>Solid waste removal and management plan after the Beirut port blast</td>
<td>Ministry of Environment, UNDP and other local initiatives</td>
</tr>
<tr>
<td>LB5</td>
<td>Capacity increase</td>
<td>COVID-19 management plan: increasing the capacity of hospital beds and isolation center beds</td>
<td>Ministry of Health</td>
</tr>
</tbody>
</table>

### Selected policies for Jordan

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<tr>
<td>JO1</td>
<td>Cash transfer / Food distribution</td>
<td>Tkiyet Um Ali - social protection for those not covered by SSC &amp; NAF</td>
<td>Ministry of Planning and International Cooperation</td>
</tr>
<tr>
<td>JO2</td>
<td>Education</td>
<td>'Darsak' official e-learning portal</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>JO3</td>
<td>Cash transfer / Food distribution</td>
<td>Jordan Emergency Cash Transfer COVID-19 Response Project</td>
<td>National Aid Fund</td>
</tr>
<tr>
<td>JO4</td>
<td>Disability</td>
<td>Protection and Response Measures for Persons with Disabilities</td>
<td>The Higher Council for the Rights of the People with Disabilities</td>
</tr>
<tr>
<td>JO5</td>
<td>Support to SMEs</td>
<td>Defense order no.9: Tadamun 1 &amp; Tadamun 2</td>
<td>Social Security Corporation</td>
</tr>
</tbody>
</table>
Inclusion of Concerned Stakeholders

<table>
<thead>
<tr>
<th>Stakeholders (Lebanon)</th>
<th>Relevance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lebanon DRM (UNDP - Gov)</td>
<td>LB1-2-3-4-5</td>
</tr>
<tr>
<td>Ministry of Public Health</td>
<td>LB 5</td>
</tr>
<tr>
<td>Ministry of Social Affairs</td>
<td>LB 1</td>
</tr>
<tr>
<td>Ministry of Economy and Trade</td>
<td>LB 3</td>
</tr>
<tr>
<td>Ministry of Education and Higher Education</td>
<td>LB 2</td>
</tr>
<tr>
<td>Banque du Liban</td>
<td>LB 3</td>
</tr>
<tr>
<td>Caritas</td>
<td>LB 1 - 4 - 5</td>
</tr>
<tr>
<td>Lebanese Red Cross</td>
<td>LB 5</td>
</tr>
<tr>
<td>Issam Fares Institute of Public Policy (AUB)</td>
<td>LB 1-2-3-4-5</td>
</tr>
</tbody>
</table>

**PROPOSED SAMPLE:** Ministry of Social Affairs

**LB1: Social solidarity program**

1. What were the **dates** for the aid distribution?
2. How was the **process** of aid distribution implemented?
3. How many families **benefited**?
4. How much was distributed (**LL**)?
5. How was the **distribution** categorized by geographic scope (level-Village – Street – Kadaa)?
6. Based on which **data** or knowledge was the **selection** of the beneficiary families/individuals performed?
7. Do you have indicators for dispersed funds and knowledge of **spending venues**?
8. Do you have a status refresh of beneficiary households’ situation? **List renewal and correction** for 2**nd** round (% correction)
## Candidate Data sources

<table>
<thead>
<tr>
<th>Sources</th>
<th>What are we measuring?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Twitter Data</strong></td>
<td>To identify what are the topics that people are <strong>preoccupied</strong> or are talking about the most.</td>
</tr>
<tr>
<td>Word Cloud analysis</td>
<td></td>
</tr>
<tr>
<td>Sentiment analysis</td>
<td>To understand what is the general <strong>sentiment</strong> expressed about the topics of interest.</td>
</tr>
<tr>
<td><strong>Google search trends</strong></td>
<td>To gauge generated <strong>interest</strong> among the population.</td>
</tr>
<tr>
<td></td>
<td>Juxtaposing these results with the major events could show what people are searching for and what are their <strong>needs and interests</strong>.</td>
</tr>
<tr>
<td></td>
<td>To be used as a proxy for unemployment.</td>
</tr>
<tr>
<td><strong>GDELT analysis</strong></td>
<td>To gauge the <strong>sentiment</strong> expressed about certain topics as well as the <strong>policy being studied</strong>.</td>
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</tbody>
</table>

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<td><strong>Mobility analysis</strong></td>
<td>Changes in mobility patterns since the start of the pandemic per district/region.</td>
</tr>
<tr>
<td>Facebook Data4Good</td>
<td></td>
</tr>
<tr>
<td>Google mobility</td>
<td></td>
</tr>
<tr>
<td><strong>Mobility analysis coupled with traditional socio-economic indicators</strong></td>
<td>Combining mobility analysis data with other available socio-economic indicators could shed light on and suggest certain correlations or potential relationships for measuring effectiveness.</td>
</tr>
<tr>
<td><strong>Satellite images</strong></td>
<td>Night-time lights in satellite images could be used as a proxy for poverty &amp; economic activity. Possible measurement of air pollution via satellite images.</td>
</tr>
<tr>
<td><strong>Open street map</strong></td>
<td>Mapping of educational institutions and/or medical institutions.</td>
</tr>
<tr>
<td><strong>Electricity consumption</strong></td>
<td>can be used as a proxy for economic activity to dentify effects on economic activity.</td>
</tr>
</tbody>
</table>
Lebanon 1: Twitter & Mobility examples

Top 20 most frequent Twitter words for the topics of interest for the months March, April, May

Mobility: Individuals in poorer areas had lower reductions in mobility and for a shorter period of time

Note: the poverty indicator is based on the % of people who declared themselves as poor or very poor in the Labour Force and Household Conditions Survey by CAS.

Q1 qazas: Batroun, Jbeil, Bcharreh, Koura, Rachaya, Keserwan, Saida
Q4 qazas: Tripoli, Zahleh, Akkar, Baalbek, Hermel, Minieh-Danniyeh

Total tweets: 3868
Total Arabic tweets: 1345 (35%)
Total English tweets: 2523 (65%)

Jordan 1: GDELT and Google Search Trends

Important dates
- Lockdown: week of March 16
- TUA’s 1st batch of in-kind aid distribution: week of March 30
- 2nd batch of in-kind aid distribution: week of April 13
- Signing agreement between the Ministry of Planning grant to support the families of day laborers affected by the repercussions of the Coronavirus crisis: week of April 27

Tkiyet Um Ali NGO reached a sudden peak of 100% on March 29th, which coincides with the date of announcement of J01.
Conclusions

- Social media and news analysis confirm: population is preoccupied with the current state of the economy, and the need to provide adequate financial support to the population at large.

- **Targeting**
  - Mobility mapping analyses suggests that the poorer districts are less likely to strictly abide by the lockdown measures: necessity to go out to work.
  - Supporting those in need economically becomes all the more important.
  - Recommended to identify populations with high urban mobility in order to advise and support them to limit and reduce the potential risk
  - Recommended that contact protection equipment is provided along with the support provided to vulnerable populations.

- **Communication** about the available aid/support and the procedures should also be reinforced in these areas, as well as the communication about the disease and protection against it.

- Recommendation to compare with the data from the aid distribution campaign for the targeted districts.

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**Jordan Policy 2: Darsak Platform**

- GDELT
- Twitter
- Google Search trends
- Website Usage Analytics
JO2: Google Search Trends Results

Darsak platform across time (Sep-Nov) peaked during exams period (October).

Darsak platform across regions (Sep-Nov) peaked in Tafilah governorate.

JO2: Google Search Trends Results

Darsak v.s. Other tools for online teaching. (Sep - Nov) across time and region.
Example of Usage of Website Analytics

Site Metrics
All visitors to this site

Engagement

Daily Pageviews per Visitor
9.1 ▶ 220%

Daily Time on Site
16:51 ▶ 288%

Bounce rate
9.8% ▶ 57%

Estimates of the time spent on the Darsak platform, % of users who only visit one page and leave (bounce rate), average of pages visited per user.

Darsak.gov.jo summary:
- ranks 22nd in Jordan
- Its global rank has gone up by 134,851 positions since 3 months ago.
- Receives approximately 206,342 unique visitors each day.

Sources explored: siteindices.com and alexa.com/siteinfo

GDELT Results

Scraped September, October, November

GDELT threshold is minimum 50 articles per week

Key dates:
01-09-2020: New academic year, students returned to schools
14-09-2020: The government announced temporary return to online education for 2 weeks
25-09-2020: The government announced extending online education until at least the end of the first semester
** decrease in GDELT and Twitter sentiment towards the end of October
Twitter Results

Key dates:
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Sentiment Analysis: Jordan DARSAK (Education)

- For GDELT, tendency towards slightly negative sentiment proceeds announcements of return to online teaching (negative education sentiment leads to return to online)
- For twitter, tendency towards more steep negative sentiment follows announcements of return to online teaching (return to online leads to negative sentiment → are parents and students not happy about online teaching?)
- However, GDELT sentiment is not as negative as Twitter
  - Arabic negative sentiment: max of 20% for GDELT compared to a max of 50% for Twitter
- For both sources, there is a major decrease in sentiment for the last two weeks of October
Lebanon Education - E-Books Download

Center for Educational Research and Development Website, through which the ministry made the school books available for download as PDF.

Site Metrics
All visitors to this site

Engagement
Past 90 Days

3.7  8:38  29.1%
Daily Pageviews per Visitor  Daily Time on Site  Bounce rate

In the past 90 days (new academic year), daily pageview per visitor and daily time spent on site decreased, while % of users who only visit one page and leave (bounce rate) increased.

Crdp.org summary:
- Ranks 148th in Lebanon
- Its global rank has gone down by 55,017 positions since 3 months ago.
- Receives approximately 19,780 unique visitors each day.

Google Search Trends - E-Books Download

Google search trends for the Center for Educational Research and Development

Peaked in November in the week of announcement of closure of schools ahead of nationwide lockdown

Peaked mostly in the southern governorates
Night-time light analysis: Admin Division Change Map
LEBANON

- Categories: average change by administrative division for each state between the years 2019 and 2020.
  - DarkBlue: a negative change between -60 and -30 was detected,
  - DarkViolet: change between -30 and 0
  - Magenta: + change between 0 and 30
  - Red: positive increase greater than 30 was observed.

- Second filter needs to be applied (the filtering mentioned before was already applied).

Outreach & Usability of Results

Prototype of Platform
1. What are the main challenges that your organisation/agency faces in terms of disaster response?
2. What type of information and data informs the design of your responses and programs?
3. What data supports policy / decision making in your work?
4. Do you collect data?
5. If so how? What is your data collection process and systems?
6. What are the methods you use to receive new cases, hotline numbers or online platforms?
7. Do you work on data gathering/collection?
8. Do you use real-time / big data sources /technology to obtain information?

Playbook for the use of emerging data non-traditional Big Data sources in:
- informing policy making and
- tracking of the implementation and effectiveness
Key messages

1. Some Data sources are made available only during Crisis
   - What is criteria
   - Who determines local/international crisis

2. Suspected concerns/trends were confirmed by SM (Tweeter)

3. Non traditional Data sources analysis facilitated better granularity

4. In cyclic crisis like Covid-19, possible to “near real time” correction

5. Bias due to technology dependence is a calculated risk

Why do Statistics organizations need the new techniques?

Added Value:

1. Achieved improvements in quality metrics (e.g. accuracy, mean squared error)


3. Opens possibilities - satellite imagery, social media at scale and frequency not affordable or possible with human labor

4. Improve efficiency by automating certain processes

5. Support relevance of official statistics as disruptive technologies are accessible

6. Demanding tech savvy, connected public with remote competitors!