

1. SUMMARY

The huge amounts of foreign aid that Afghanistan has received for development during the last 15 years have not eradicated poverty or guaranteed sustainable development for the future. In this new 15-year period (2016-2030) the Sustainable Development Goals are to be achieved, and we think a complex systems approach must be embraced for creating and evaluating development strategies.

We propose to make use of open data and complex systems principles to create development models and strategies. For this purpose, Bayesian networks, agent-based models, dynamical systems and genetic algorithms might be useful scientific techniques.

This project is a final master's project that will run from June to September 2016, and is expected to lead to a PhD. We present this poster in Global Ambitions Conference to promote complex systems approaches among attendees and get feedback from their perspectives on sustainable development.

2. AFGHANISTAN'S FOREIGN AID IN RECENT YEARS

Afghanistan ranks among the top countries in receiving official development aid:

	2012	2013	2014	3-year average	% of all recipients
1 Afghanistan	6 667	5 262	4 823	5 584	4%
2 Viet Nam	4 114	4 083	4 218	4 138	3%
3 Egypt	1 807	5 508	3 532	3 616	2%
4 Ethiopia	3 221	3 885	3 585	3 564	2%
5 Syrian Arab Republic	1 672	3 638	4 198	3 169	2%

Figure 1: Top ODA recipients of period 2012-2014 [1].

Despite huge amounts of aid and some unquestionable progress, sustainable development has not been achieved [4]. This is reflected in the fact that Afghanistan ranks in the position 171 of 188 countries in the Human development Index 2015 (last world position among non-African countries) [2]. Also, it is reflected in the fact that the Millennium Development Goals were just partially completed [3].

So why sustainable development in Afghanistan has not been achieved despite huge amounts of foreign aid? There may be many valid explanations like bureaucracy of NGO's, corruption, insurgencies, lack of foreign investment, and more... but one of the most important is that the problem has not been tackled with a complex systems approach.

3. COMPLEX SYSTEMS PRINCIPLES APPLIED TO INTERNATIONAL AID

There are no recipes for dealing with foreign aid in underdeveloped and fragile countries like Afghanistan. However, there are basic principles rooted in complexity science that can be very useful for solving complex problems.

Natural selection vs. complete design

- Planning trap: a society cannot be planned from scratch, it should evolve.
- The accumulation of several smaller projects that create change at local levels (i.e. communities) will result in larger effects at higher levels, but without the destabilizing effect of large projects. Successful local initiatives can be used as models for projects with a wider scope and can be copied and improved in other places.

Distributed control (not centralised one)

- Complexity can be better handled by many people. Local people will benefit if control is also given to them.
- Wisdom of the crowds → It is wise to take seriously into account people's opinion before implementing projects.

System's structure

- Distribute aid in such a way that a socio-economical structure is improved and not destroyed.
- There are many levels of action (i.e. person, community, nation), the best is usually a community level.
- An increase in the scale of a systems can lead not just to quantitative but qualitative changes. For example, as a city grows in size and population, crime per capita tends to increase, as well as economic specialization and diversification.

Adaptive strategies

- Strategies that can easily adapt to the environment are better than fixed ones. Monitoring and feedback is highly important.

Stability

- Huge inputs of aid can generate instabilities.
- Application of stabilization forces are needed to counteract restoring forces after interventions.

Interdependence

- One cause can have multiple effects, and one effect multiple causes. Systems are not isolated, they are usually interdependent internally and externally (environment). It is important to be careful when inferring causes from observed effects.

Cooperation vs. competition

- The development of social structures that can lead to effective social systems arise from cooperation at one level and competition at other levels.
- Networks of organizations with common goals can enjoy benefits of cooperation.

Non-linearity

- A system is not the sum of its parts. Effect of aid will not be proportional to the amount of money.
- Little things can induce cultural tipping points in society (i.e. gender equality).

Information

- Information data is not just about time series or pie charts, but also about networks and spatial descriptions (i.e. GIS). Making use of several types of big-data can be very beneficial for achieving sustainable development.

4. TIME FOR A CHANGE

Afghanistan is in the beginning of a new era. In the period 2016-2030, the 17 Sustainable Development Goals must be accomplished.



Figure 2: List of Sustainable Development Goals 2030

Also, the known Transformation Decade (2015-2024) has just begun. The Afghan government claims to have learned that precipitous drops in assistance promotes instability. They also want aid to be used effectively, and reduced in a phased and responsible manner so the country becomes self-sufficient [5].

The beginning of this new era is an excellent time for implementing complex systems principles for achieving the development goals.

5. PROPOSAL

Complexity science principles and data mining can be used to design strategies for Afghanistan's transition from a foreign aid dependent country to a self-sufficient country.

Data

- Lots of data available from OECD, World Bank, UN, Afghan Government, etc.
- Study failures of last 15 years aid in Afghanistan.
- Study signatures of good economic development in developed countries, and try to produce a goal signature for Afghanistan.
- Use data to find cause-effect phenomena in Afghanistan that can apply for the following years.

Experts opinion

- Ask advice about cause/effect phenomena in Afghanistan that can apply for the following years.
- Identify key actors in development (i.e. Afghan government, foreign organizations, Afghan women).
- Determine how to deal with a fragile country as Afghanistan.

Models and strategies

- Define indicators for each of the 17 SDG2030 goals.
- Build Bayesian network (or random dynamical system network) where every aid is an energy input (take into account transformation and conservation of energy), such that the future effects of aid can be forecasted. Model makes use of complex systems principles mentioned.
- Simulate strategies on network and optimise them using genetic algorithms.

After doing the data analysis and making a model, we should evaluate in a realistic way and with the consent of experts how the model and strategies can be implemented and monitored.

6. REFERENCES

1. Development aid at a glance, statistics by region (developing countries), 2016 edition, OECD.
2. Human Development Report 2015, UNDP.
3. The Millennium Development Goals (2012), Ministry of Economy, Islamic Republic of Afghanistan.
4. Afghanistan: A Synthesis Paper of Lessons from Ten Years of Aid, Inder Sud, commissioned paper for the Independent Evaluation Group of the World Bank, 2013.
5. <http://mfa.gov.af/en/page/6547/transformation-decade2015-2024>, Ministry of Foreign Affairs, Islamic Republic of Afghanistan.