Presentation on Agricultural Productivity

Team members:

1. Ameha Mulugeta.................................. PHD candidate Innovations
2. Biruk G/meskel(Leut.)........................Productivity improvement head Project Management
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Overview of purpose and results

- The purpose is to provide a better solution of the problem in national level using systems engineering basic principles and guidelines.
- Output is usually measured as the market value of final output, which excludes intermediate products such as corn feed used in the agricultural industry.
- This output value may be compared to many different types of inputs such as labor and land.
Background/Motivation

• Agriculture accounts for 46.3% of the GDP, 83.9% of exports, and 80% of the labor force.
• Ethiopia’s potential in agriculture
• The global market’s potential is good
Approach

System Engineering methodology

System characterization:

Problem type of the sys. Is:

- Severly stochastic
  - 1 Deterministic
  - 2 Moderately stochastic
  - 1 Severly stochastic
Approach

**Reductionism:**
Our system takes on characteristics from its subsystems which are the domain elements listed above. After checking every component then the system characterized as severely stochastic.

Our System in the BUMPY Terminology space
Result
<table>
<thead>
<tr>
<th>No</th>
<th>QOL</th>
<th>Improvement Effect of the Dimension</th>
</tr>
</thead>
</table>
| 1  | HH  | Increased income results health services available
     |      | Awareness in health & environment protection
     |      | Quality of crops and animals ascertains health of citizens |
| 2  | CiG | If government takes this initiative, it builds confidence
     |      | farmers have on the government;
     |      | Effective value chain establishes trust that
     |      | farmers/pastoralists, traders and general market appreciate
     |      | for its benefit and thus confidence they have |
| 3  | EWB | Increased productivity of farmers will be distinguished by
     |      | improvement of household income
<pre><code> |      | Improved income strengthens the buying power of the citizens |
</code></pre>
<table>
<thead>
<tr>
<th>No.</th>
<th>QoL</th>
<th>Improvement Effect of the Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>AoS</td>
<td>Improved economy of farmers sustains establishment of new service providing organizations in health, education, transportation, telecommunication, information technology and others</td>
</tr>
<tr>
<td>5</td>
<td>HR</td>
<td>Improved agricultural output assures citizens get the most critical human right request fulfilled: FOOD</td>
</tr>
<tr>
<td>6</td>
<td>CHP</td>
<td>Team work, which is key in traditional agriculture will be supported and sustained in improved agricultural system</td>
</tr>
</tbody>
</table>
Summary & conclusions

• Agricultural Productivity Improvement needs cross cutting intervention in the sector;
• Different stakeholders need to be concerned for its improvement, METEC being one;
• Observations made so far showed improvement of the sector would improve QoL of Ethiopians;
• The sector has the potential to improve lives of more than 85% of the population;
Recommendations

• System Engineering is a powerful tool we can exploit to realize Quality Driven, Rapid Development of our nation by ratifying policy directions in Agricultural Productivity;

• Dimensions of quality of life for Ethiopian citizens can improve through these policy interventions
Agricultural Productivity is Inadequate in Quality and Quantity

Team Members-2

1. Kassu Jilcha (AAiT)
   - Project manager
2. Alemu Sirna (METEC)
   - Technical
3. Hailu Tirfe (METEC)
   - Communication
4. Yitagesu Yilma (AAiT)
   - Innovation

July 26, 2013
1. Overview of Purpose and Results
System Engineering initiation helped to understand:
- Modeling engineering systems
- Identifying vital issues of Ethiopia
- Concepts, Definitions, & the Systems Engineering Paradigm.
- Decision Modeling tools for BUMPs.
- Application of system Engineering tools in solving BUMPs
- Fundamental Principles of Engineering Ethics, Policy Research Results, & Dynamic Modeling tools for BUMPs
2. Background/Motivation

Objectives

Vital Issue of Ethiopia "Quality Driven Rapid, Development at National Level in Resource Utilization and optimization"

- One of the vital Issue, “Agricultural Productivity Inadequate in Quality and Quantity”

*Agricultural productivity refers to the ratio of agricultural outputs to agricultural inputs*

- Agriculture accounts for 46.3% of the GDP, 83.9% of exports, and 80% of the labor force in 2011/2012.

- Many other economic activities depend on agriculture, including marketing, processing, and export of agricultural products.
3. Approach/Methodology

In attempting to solve the inadequacy of agricultural productivity, the following approaches were used:

1. Vital Issue identification
2. Defining the system dimensions
3. Characterizing of the system dimensions
4. Selection of tools for solving
   - AnyLogic software
   - System dynamic
   - Decision making
     - Social Movement Theory
5. Conclusion and recommendation
4. Results and Discussion

**QoL dimension**
- Human Health and environmental Quality
- Confidence in Government
- Economic Wellbeing
- Availability of service
- Human Right
- Cultural Heritage preservation

**Policy options**
- Regulations
- Fiscal Incentives
- Information, Education, Outreach
- Technology Development & Deployment
- Inter/Intra Organizational Relations
- Enforcement
4.1. Characterization of System
Role of Reduction and Reverse Reductionism

Role of Reduction

- Enabling analysis of each subsystem to understandable easily
- Enabling to see the contribution of each subsystem to productivity improvement thereby addressing QoL dimensions

Role of Reverse Reductionism

- Is to help in synthesizing or concluding in one idea of all subsystem ideas as Agricultural productivity improvement for QoL dimensions
Agricultural productivity is BUMPy
4.2. Social Movement Theory

1. Framing process

Problems
- Rising unemployment
- Poverty enhancement
- Low GDP per capita
- Economic fluctuation
- Emigration of the farmers

*Rational motivate Collective action and support*
- Major societal benefit frame
- Consistency of frame
- Major economy/GDP

Strategic and tactic solution
- Utilizing modern technology
- Creating agricultural based awareness
- Creating sustainable infrastructure that address farmer/value chain
- Availability of information flow
- Controlling environmental impacts

2. Opportunities and Constraints

Opportunities
- Government support
- Competence with Africa
- Availability of resources/man+land/
- Technology utilizations
Constraints

- Natural disasters like flood, earthquake, volcanic eruption,
- Lads ups and downs
- Emergency of swarms
- Animal diseases
- Seasonal fluctuation
- Uneducated farmers

3. Resource Mobilization

Mobilization media

- Government and private media like TV, radio, internet, magazine, etc
- Government organizational structure
- Seminar training, education, practice etc

Public perception

- Informal social network membership
- State government
- NGO’s participation
- Local associations like kebele, edir, eKueb
4.3. System Dynamics

- Agricultural input
- Productivity rate
- Yield
- Technology contribution
- Government contribution
- Input stock
- Government effect
- Technology effect
5. Summary & Conclusions

It has been discussed that about:

➢ The VI identified has got important role in bringing QoL for Ethiopian citizen

➢ Agriculture production system can be modeled and analyzed using Social movement theory and SD modeling

➢ The contribution of technology and Government paramount in increasing agricultural productivity

➢ The relationship among QoL dimension and policy options & integrating with the vital issue
6. Recommendations

The recommendation for this project is:

- Applying up-to-date technology is granted for agricultural productivity
- The contribution of government support is very essential
- Decision makers should use the system engineering tools to model and analyze such a complex problems at national level
- Incubation centers development for agriculture sector
Thank You
Brain Drain Team 1

Vital Issue

The brain drain in certain critical areas of the country is too great to support sustainable development.

Team Members:
Netsanet Jote (AAiT)
(Communication and Innovation)
Meseret Alemu (AAiT)
(Technical Content and Project Management)

July 26/2013
Overview of purpose and results

Objective

Identifying and analyzing of Policy Portfolio for the “to minimize Brain Drain” that promotes “quality driven, rapid development at the national level through resource utilization and optimization.”
Background/Motivation

✓ Brain drain (or human capital flight), is the large-scale migration of a large group of individuals with technical skills or knowledge.

http://en.wikipedia.org/wiki/Brain_drain

✓ The African continent is losing many highly qualified professionals.

✓ Ethiopia and other sub-Saharan African countries are among the worst hit by the brain drain.

✓ Sub-Saharan African countries that invest in training doctors have ended up losing $2 billion as the expert leave home to find work in developed nations,

✓ World Bank's Global HIV/AIDS Program, Ethiopia has only 1 medical doctor per 100,000 people

Approach

- Systemic Characterization
- Reductionism and Reverse Reductionism
- Systems Thinking: BUMPS
- Decision Modeling
  - Sequential Decision Analysis
  - Social Movement Theory
- Dynamic Modeling
  - System Dynamics
- Federation of Models
  - Dynamic ~ Decision
Result
Systemic Characterization for Brain Drain

Domain

External-Dimension

Human Right Violation

Government Universities

Private Universities

Training Research Institutes

Manufac. Service Industries

Political Issues

Living Condition

Developed Country Opportunity

System Boundary: Brain Drain in the Country

Dynamics: Information, Material, People, money
Reductionism: brain drain as a vital issue is causing the migration of graduates from Government and Public Universities in different fields to abroad. As a result there is shortage of skilled professional (for example medical doctors, university professors)

Reverse Reductionism: the contributions of each components of the subsystems are causing brain drain in the Country. For example, the migration of medical doctors, engineers, academic professors in different professions are the major contributors for brain drain.
Brain Drain in the Country

Systems

Wicked Systems

Government Universities

Adaptive Systems

Systems with Emergent Behavior

Intelligent Systems

BUMPs
Categories of Brain Drain system

- **BUMPs**: Manufac. Service Industries
- **Severely Stochastic**: Training Research Institutes, Private Universities
- **Moderately Stochastic**: Government Universities
- **Deterministic**: None
Decision Theory
Social Movement Theory

I. Framing process

1) Problems

✓ Better remuneration
✓ Job satisfaction
✓ Corruption
✓ Lack of facilities
✓ Inadequate living condition
✓ Human rights violation
✓ Political condition

2) Provide rationale to motivate support and collective action

✓ Highly skilled professional per population low (such as doctors, academic professionals)
✓ Over 75% Of highly skilled professional left the country
✓ The brain drain problem has been critical with the past 30 years
✓ The society considers brain drain as a normal trend

3) Solution

✓ Awareness creation
✓ Job opportunity creation
✓ Revise the existing policies
II) Opportunities and constraints

1) Perception of opportunities and constraint

Opportunities
✓ Economic crises in developed countries
✓ Job opportunities in the country
✓ Non-professional work in destination countries

Threat
✓ Peoples considers traveling abroad as a sign of achievement

2) Access to political institutions and decision making
✓ There are access e.g MOE, universities and research centers

3) Rationale for decision making
✓ Minimize brain drain in the country by increasing the opportunities

III) Resource Mobilization
To create awareness in the country. We can use media
✓ ETV
✓ Newspaper
✓ Website

Public perception
✓ Professional association
✓ EAS
Dynamic Modeling
System Dynamics

<table>
<thead>
<tr>
<th>Wage rate</th>
<th>Human Right</th>
<th>MD Remain in Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.001</td>
<td>0.0005</td>
<td>3,613</td>
</tr>
<tr>
<td>0.002</td>
<td>0.001</td>
<td>6,964</td>
</tr>
<tr>
<td>0.004</td>
<td>0.002</td>
<td>12,959</td>
</tr>
</tbody>
</table>
Federation of Models
Dynamic ~ Decision

Revise the existing salary policy
Conclusion

• Brain drain is the main vital issue that should be addressed for the sustainable development of the country.

• Brain drain affects the Quality of life dimensions;

• To alleviate this issue, system thinking and system thinking tools are very powerful.
Recommendation

• Revise the existing salary and human right policy so as to decrease the negative impacts of brain drain for the country development.

• Considering the tools of system thinking and system thinking tools are very vital to address the vital issue - brain drain.
Thank You

Brain Drain
Vital issue...

The *brain drain* in certain critical areas of the country is too great to support sustainable development.

Team Members(Brain Drain Team 2)

1. Shewit W/Gebriel-----AAIT------------Innovation
2. Birhane Desalegn------HAEI--------Communications
3. Melese Masresha-------MFI----------Technical Content
4. Algaworash Abadi------BAI---------Project Management

July 26/2013 G.C
Overview of purpose and results

The purpose of this study is to give an insight that helps in solving the identified vital issue of the country which is brain drain that have a great impact on “quality driven, rapid development at the national level through resource utilization and optimization” by the application of advanced systems engineering.

As a result, the root causes of brain drain are identified and alternative solutions are suggested to minimize brain drain and enhance the quality of life dimensions of Ethiopians.
Background

- The African continent is losing many highly qualified professionals.
- Ethiopia and other sub-Saharan African countries are amongst the worst hit in a brain-drain.

Source: OECD, 2005.
Objective

Identify and begin the analysis of a Policy Portfolio that promotes “quality driven, rapid development at the national level through resource utilization and optimization.”

The problem is The brain drain in certain critical areas in the country is too great to support sustainable development
Study approach

- Engineering methodology:
  - To solve our vital issue “brain drain in the country”, concepts of both science and engineering are used.
  - The First Law of Systems: the whole system “brain drain” is more than its domains.
  - The Second Law of Systems: Optimizations of the domains in the sub systems doesn’t mean that optimization of brain drain to solve

- System Characterization
  - Domain dimension: there are five different fields in our system having Bumps problem.
  - Dynamic dimension: money, material ,information
  - External dimension: professional seekers from different countries

Therefore ,the identified problem in all areas is high brain drain especially in the medical field.

- Reductionism and reverse reductionism
  - The five domain elements are subdivided into; MF into five, Eng. F into six, teaching F. in to more than ten, social F. in to many sub divisions.
  - The problem identified in the subdivided fields is generalized to overall problem identification and solution proposal to brain drain in the country. The case of medical field brain drain is specifically has the potential value for the overall system brain drain minimization.
System Characterization

Brain drain in Ethiopia

Approach...

- **Decision modeling**
  - The social movement theory is used in our case. Based on this; framing the process: problem diagnosis, rationale to motivate support are provided and come up with solution offers.
  - In resource mobilization: different mobilization medias in the country like megazines and newspapers are used.

- **Dynamic Modeling**
  - Among the various dynamic modeling approaches, the system dynamics of Bass Diffusion model is used for simulating the existing situation.
Results

• Decision modeling: as a result of SMT, revising the existing work related policies and work for the right implementation is recommended.
  – In the analysis of opportunities and constraints, came up with the rationale for decision making: to maximize the local training opportunities and result in minimizing the adversity of brain drain by blocking the access of going abroad.
  – To enhance the public perception on the positive outcome of working in the country. Different SMOs are working on this (Ministry of Foreign Affairs and Ministry of Health).
Federation for our Vital Issues (brain drain)

- Brain drain Federation
  - System Dynamics (Bass Diffusion)

- Modeling the effects of
  - Remuneration and
  - Facilities

- Exploring the number of brain drain on specific field of medical doctors in Ethiopia.
System Dynamic model: Quantifying the effect of remuneration and Facility
Summary and Conclusion

• It can be concluded that, the existing brain drain in the country is too great especially in the medical field. Thus, the use system engineering can be helpful in improving the life of citizens by enhancing the quality of life dimensions.
Recommendations

• As a result of this study, it is recommended that the existing policies should be revised to be helpful in minimizing the existing brain drain in the country and come up with a solution to bring sustainable development in the county.
Sustainable Business Startups are inadequate to absorb the Ethiopian Youth: \textit{The Case of SME’s}

Team members: Shiferaw Sorsa, Behailu Taye, Abebe Beyene
Increasing professional entrepreneurs in quality and quantity through:

- Intensive training courses of entrepreneurship at all levels
- Changing the work-paradigm of youths to create their own business
- Promoting local businesses through SMO’s and exhibition bazars
- Facilitating credits/loans through local and foreign banks and CSA’s
- Tax deductions on startup businesses
- Minimizing the gap b/n the wage level of employed workers and the current demand of life
- The implementation of transparent and attractive policies toward business creation
2. Motivation

- The number of newly created job opportunities is insufficient to provide positions for the youth entering the job market.
- Few start up business enterprises are sustainable.
- The increasing gap between the annual number of graduates and the market demand to accommodate youths (15-24 age).

3. Approach

3.1. Domain elements, Commodities, and External Dimensions.

- Government agencies:
  - Business policy making Dpt.
  - Marketing and promotion
  - Entrepreneurs association
  - SME administration
  - Business planning Dpt.
  - GOVT - Small and Medium Enterprises Development
  - Technical and Vocational Training Institutes
  - Ministry of trade and Industry Development sector
  - Road and Transport sector
  - Science and technology Institute
  - Ministry of Revenue and Custom authority
  - Building construction sector
  - Land Development and management sector

- Flow of information, cash, and people:
  - Information
  - Cash and people
  - Information, cash, people
• **3.2 Characteristics of BUMPs in SME’s**
4. Results

4.1 Theory - social movement theory

4.1.1 Framing Process

- Lack of Knowledge of Entrepreneurship skill
- Poor marketing assessment skill
- Insufficient skill to sustain business
- Absence of Entrepreneurship course in the curriculum
- Lack of Creativity and Innovation

Ease of mobilizing productive youths to create their own business

- Incorporating the course of entrepreneurship in the low and hire education institutes
- Creating non bureaucratic procedures for getting land & loans
- Corruption free environment for business creation
- Tax minimization for small and medium enterprises in the start-up phase
- Tax deduction for the input raw materials import
- Subsidizing small and medium enterprises in the country
4.1.2 Opportunities & Constraints

• **Opportunities**
  - The increase in the number of graduate intellectuals from government and private institutes.
  - The focus of the government in promoting the youth to create their own business in the form of SME
  - Access to free market
  - The creation and expansion of the credit and saving associations to support business start-ups

• **Constraints**
  - Globalization
  - Tax policies
  - Poor level of economy to start businesses
  - Poor level of promoting local products
  - Corruption
4.1.3 Resource Mobilization

• Initiating the work of mobilization through electronic medias like internet, television, etc. and magazines and news papers.

• Increasing the work of promotion through exhibition bazars and related SMO’s.

• Subcontracting strategies with government and political officers.

• Initiating public perceptions through public meeting in local associations.
4.2. Modeling approach- Agent Based Modeling

The ABM modeled with Any Logic software shows the *main reasons* that attribute for the failure of businesses start-ups which are:

- The lack of entrepreneurship course in the curriculum at all levels
- High level of taxation on the start-up businesses
- Lack of non-bureaucratic and corruption-free land access for the businesses
**Impacts on QoL Dimension**

- Generate better income for **better health**
- The creation of secure and sustainable businesses create **CIG**
- **Economic well-being:** create additional income on the per capita
- **Availability of services:** due to startup of various service sectors
- Businesses has a capacity to build positive image to promote our **cultural heritages**
- Successful entrepreneurs have the capacity to stand for their **human rights**
5. Commentary

5.1. Conclusion

- Since coming to power in 1991, the Ethiopian government has strived to create an environment that supports entrepreneurship. Almost 20 years later, however, the highly productive small and medium-sized enterprise (SME) sector remains limited because of the following reasons:
  - Insufficient subsidies for business sustainability
  - High tax rates on the startup businesses
  - Lack of conducive climate for business startups
  - The high level of corruption and long and bureaucratic procedures to access in land, and other facilities.
  - The poor work paradigm of the people
5.2 Recommendations

Therefore, *in order to create a conducive climate for businesses, the gov’t should:*

✓ Incorporate the course of entrepreneurship in the curricula at all levels
✓ Reduce taxes for the startup SME’s
✓ Facilitate non-bureaucratic procedures for access to loans from banks and CSA’s
✓ Should provide land and other facilities with confidence
✓ Promote the local businesses through SMO’s and exhibition bazars.
The locally instituted quality of education at all levels is insufficient to provide for the need of students.

QUALITY EDUCATION TEAM 1

1. ERMIAS TESFAYE (AAIT) - Project Manager
2. ESKINDER GIRMA (CEMI) – Communicator
3. ABDURHAMAN KEDIR (AGI) - Innovator
4. TADELE AEMIRO (EPEI) – Technical
5. WOGAYEHU GIZAW (R&D) - Innovator
OVERVIEW PURPOSE AND RESULT

Objective

- Identify and begin the analysis of a Policy Portfolio that promotes “quality driven, rapid development at the national level through resource utilization and optimization.”
BACKGROUND

• A recent key study was the largest Early Grade Reading Assessment (EGRA) in Africa. Results of the EGRA showed that the majority of students in Ethiopia are not reading at the appropriate levels of comprehension by the end of grade three.
Systematic Characterization of QE
1. Decision Modeling (Social Movement Theory)

✓ **Framing process**
  - Theoretical based curriculum
  - Not interest based department selection
  - Improper school distribution
  - Ethical problem
  - Integration problem among university and industries
  - Inadequate teaching learning materials

✓ **Provide rational to motive support and Collective actions**
  - Motivate students and teachers with incentives
  - Cultural consistence

✓ **Offer solution strategies and tactics**
  - Professionalism should come first
  - Provide Continuous training for instructor
  - Improve salary
  - Improve integration among university and industries
  - the curriculum should be practical and ICT based
2. Opportunity and constrain

✓ **Opportunities**
  - Gov. policy
  - No of department rise
  - TVET program development
  - Affirmative action on female student and students from developing region

✓ **Constraints**
  - Limited or inadequate resource
  - Unskilled performance of instructor
  - Brain drain
  - Salary

3. Resource mobilization

3.1 mobilization media

✓ Relatively electronics media is working much better than printing media

3.2 public perception

✓ Positive perception
  - High intellectuality on ICT
  - Good perception on adult education and new department

✓ Negative perception
  - Poor reading habit
  - Less student interest on challenging department (technology and medicine)
  - Interest on market based department

✓ SMOs :- there is no much better involvement
System Types

- **System is complex**: it can’t be fully explained by understanding its components.
- **Adaptive**: adjust itself to different conditions and environment.
- **Emergent behavior**: complex pattern formation from simpler rules.
- **Wicked problem**: the solution of one of its aspect may reveal or create another even more complex problem.
- **The system is not system of system**: if we take out one of the sub system like students the system will not exist.
APPROACH cont....

- Student and teachers
- MOE and curriculum

- school
  - Moderate stochastic
  - Severely stochastic
  - BUMPYs
BUMPy Terminology Space…
Standardized Exam Simulation using SD
COMMENTARY

Summary & conclusion

– Using systematic engineering method it is possible to generate systems for quality education in easiest way
– Quality of education should be improved to increase the QoL of the citizens
– The solution that given on the social movement theory is the basic solution for quality education
– The system dynamics approach used to assess the examination of students can be used at all levels together with the Discrete-event Simulation
Recommendation

- The value taken to evaluate quality of education in our country is not the actual data. In order to get the real numeric impact of the quality of education in Ethiopia, further researches should be conducted.

- It is highly recommended to use system Engineering approach in predicting the impact of different policies to the quality of Education through research.