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# Identifying Research Priorities for Sustainable Agriculture Intensification – Academia and Private sector Links

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# Outline

- Introduction
  - Regional development challenges
  - Agricultural Productivity
  - Climate change impacts
  - Climate change adaptation in Eastern Africa
  - Conclusions
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# What is Research?

- is a human activity based on intellectual investigation that is aimed at discovering, interpreting, and revising human knowledge on different aspects of the world.
    - Research can use the scientific method, but need not necessarily do so.
  - It could be;
    - Basic – seeks to expand our knowledge base
    - Applied – seeks to solve practical problems
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# Scientific Method

- The scientific method is a way to ask and answer scientific questions by making observations and doing experiments.
    - It is a process of harnessing curiosity
  - The scientific method proceeds through 6 stages:
    1. Ask a question (observe a problem)
    2. Do background Research (literature review)
    3. Construct a hypothesis (conceptual framework)
    4. Test your hypothesis (experiment/survey/methodology)
    5. Analyze data and draw conclusions
    6. Communicate your findings
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# 1. Observe a Phenomenon (ask a question)

- The scientific method starts when you ask a question about something (some phenomena) that you observe:
    - What, When, Where, Who, How, Which, Why?
  - All phenomena of nature are of interest irregardless of their magnitude.
    - In order for the scientific method to answer the question it must be about something that you can measure, preferably with a number.
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## 2. Do background Research (literature review)

- Rather than starting from scratch in putting together a plan for answering your question, you want to be a savvy and use library and internet to help you find the best way to do things and ensure that you don't repeat mistakes from the past.
    - Who did what where and when?
    - How was it done?
    - What were the findings?
    - How different is your proposed study from others?
  - Why is it necessary to undertake a literature review?
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## 3. Construct a hypothesis

- A hypothesis is an educated guess about how things work:
    - *"If \_\_\_\_\_[I do this] \_\_\_\_\_, then \_\_\_\_\_[this]\_\_\_\_\_ will happen."*
  - You must state your hypothesis in a way that you can easily measure, and of course, your hypothesis should be constructed in a way to help you answer your original question.
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## 4. Test the hypothesis by doing an experiment (survey)

- Your experiment tests whether your hypothesis is true or false.
    - It is important for your experiment to be a fair test.
    - You conduct a fair test by making sure that you change only one factor at a time while keeping all other conditions the same.
  - You should also repeat your experiments several times to make sure that the first results weren't just an accident.
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## 5. Analyze Data & draw conclusions

- Once your experiment is complete, you collect your measurements and analyze them to see if your hypothesis is true or false.
    - Scientists often find that their hypothesis was false, and in such cases they will construct a new hypothesis starting the entire process of the scientific method over again.
    - Even if they find that their hypothesis was true, they may want to test it again in a new way.
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## 6. Communicate the findings

- To complete your science fair project you will communicate your results to others in a final report.
  - Professional scientists do almost exactly the same thing by publishing their final report in a scientific journal or by presenting their results on a poster at a scientific meeting.
  - This has been the weakest link between academia and the private sector
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# Regional Development Challenges

- Low agricultural productivity
    - Production risks
    - Post harvest losses
  - Food and nutrition insecurity
    - Hidden hunger
  - Climate change
    - Frequent draughts, vulnerability & resilience
    - Degradation of natural resources
  - Weak regional trade
    - Insufficient regional infrastructure
    - Limited market access
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# SSA Agricultural Productivity

- Agricultural productivity in SSA is only half the rate of growth of other developing regions in the world.

Keith and Rada, 2013 found out that,

- 1962 – 1985 ( 2 decades): agricultural growth stagnated.
  - 1986 – 2008 (Another 2 decades): agricultural grew at a rate of 1% only.
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# Causes of low productivity

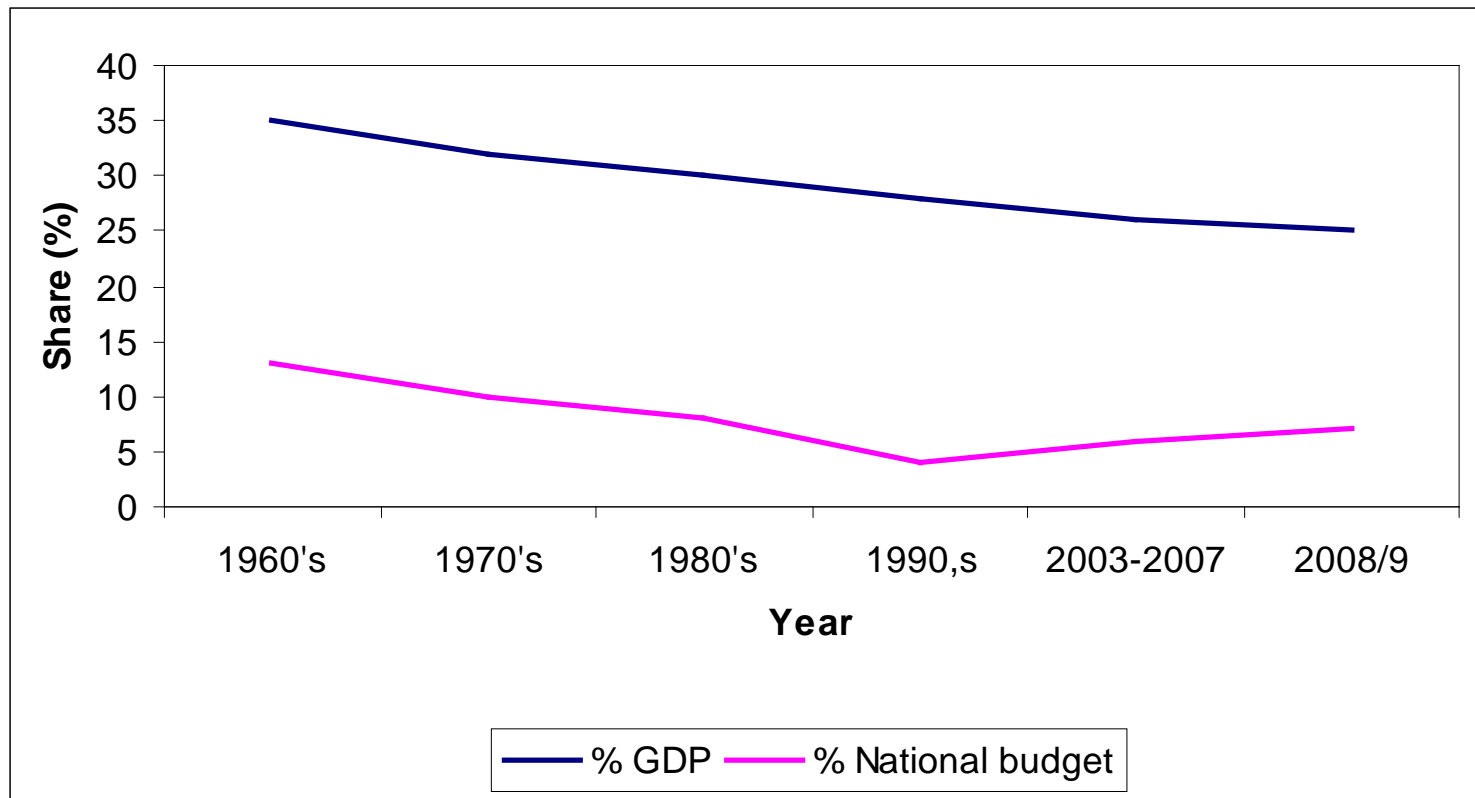
- Poor soil management – low fertilizer use in Africa (can no longer support the current food demand).
    - Africa consumes 2.9% of world fertilizer (FAO, 2012).
  - Highly heterogeneous social systems – making up-scaling of best practices almost impossible.
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# Causes of the poor performance

- Under budgeting
    - most African countries are yet to meet the 10% budget allocation to agriculture.
  - Civil conflicts – the 2007/08
    - three months conflict in Kenya whose effects are still with us 8 years after.
  - Diseases – top on the list including HIV/AIDS, Malaria, TB.
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# Agricultures share of GDP & budget in Kenya



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# Priority Areas

- Participatory research
    - \$ 1 invested in international research, yields \$6 worth of benefit; \$1 invested in national research yields \$ 3 worth of benefit.
  - Up-scaling and adoption of best practices
  - Informed policies that support agricultural growth
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# Priority Areas

- Improvement of public infrastructure – feeder roads, power supply, irrigation schemes.
  - Improvement of market performance – through information management.
  - Improved property rights – especially land.
  - Provision of incentives
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# Some Private sector initiatives

- Agricultural input systems
  - Insurance – Weather index based insurance
  - Agricultural credit
  - Contract farming
  - Post-harvest loss management technologies
    - Hermetic bags
  - Market information systems – Drumnet
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# Market based Risk management Mechanisms in ESA

- The most common market based risk management tools in the ESA deal with price and production risk.
    - Warehouse receipt Systems
    - Grain stock management
    - Agricultural commodity exchanges
    - Agricultural Information systems
    - Contract framing
    - Marketing and trade policies
    - Insurance
    - Farm safety nets
    - Technology development and adoption
    - Financial services
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# Climate Change Impacts

- CC presents one of the greatest development challenges facing the world today
    - More adverse effects predicted for Africa
  - Much of the impact of climate change on Agriculture in Africa is predicted to be through a reduction in the Length of the Growing Period (LGP) – (Thornton et al., 2006)
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# Climate Change Impacts in Africa

- Shifting rain patterns - (Floods/draughts)
    - Food insecurity
    - Acute poverty
  - Increased disease infections and resurgence of new/eradicated diseases
  - Rising sea levels damaging coastal resources and infrastructure
  - Reduced biodiversity
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# Food and Nutrition Insecurity

- Close to 1 billion people in the world are undernourished
    - In Africa, 20% of the population is undernourished
  - Priorities;
    - CAADP and the 2014 Malabo declaration
      - Allocate 10% of public expenditure to agriculture
      - Double productivity by 2025
      - Reduce postharvest losses by half
      - Reduce stunting by 10%; underweight by 5%
      - Triple agricultural trade
      - Establish public private partnerships
  - Research question – Evaluation?
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# Climate Change Adaptation

- Adaptation refers to any adjustments in to the current or expected climate effects (IPCC, 2007).
    - Adaptation remains a nebulous concept lacking clarity on what does/ does not fall within the boundaries of adaptation
  - Ensuring food security will require substantial investments and actions to adopt agriculture, forestry and fisheries to climate change challenges
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# Climate Change Mitigation

- Any actions taken to reduce the concentration of GHGs
    - interventions to reduce GHG emissions or enhance the GHG sinks.
  - Given the low levels of carbon emissions in Africa, there is a temptation to place lesser emphasis on mitigation.
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# Adaptation Strategies in East & Central Africa

- The climate change adaptation strategies adopted by the East and Central Africa countries are diverse
  - The CC adaptation strategies target;
    - Agriculture - crops and livestock
    - fisheries
    - Energy
    - water resources
    - natural resources – forestry/wildlife
    - Public health
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# Climate change Strategies Within ASARECA

| No | Adaptation strategy  | Country |      |     |     |    |     |     |     |    |    |
|----|--|---------|------|-----|-----|----|-----|-----|-----|----|----|
|    |  | BR      | DR C | ETH | ERT | KE | MDG | RWD | SDN | TZ | UG |
| 1  | Drought-tolerant & early maturing crop varieties                   | X       | X    | x   | X   | X  | X   | X   | X   | X  | X  |
| 2  | Renewable energy sources, such as solar power                      | X       | X    | X   | X   | x  | X   | X   | X   | X  | X  |
| 3  | Investment in irrigation   | X       |      | X   | X   | X  |     | X   |     | X  | X  |
| 4  | Reducing overall livestock numbers by sale or slaughter            | X       |      |     | X   | X  |     | X   | X   |    |    |
| 5  | Cross-breeding , zero-grazing, and keeping smaller livestock       | X       |      |     |     |    |     | X   | X   | X  | X  |
| 6  | Conservation and restoration of vegetative cover of degraded areas | X       |      | X   | X   |    |     | X   | X   |    |    |
| 7  | Adopting Integrated Disease Surveillance systems for epidemics     |         | X    | X   | X   |    |     | X   |     | X  |    |
| 8  | Adopting traditional methods of conserving natural forest          | X       | X    |     |     |    | X   |     |     |    | X  |
| 9  | Delimiting all protected areas to avoid encroachment               | X       |      |     |     | X  |     |     |     | X  | X  |
| 10 | Inaugurating community-based management programs for forests       | X       |      |     | X   | X  |     |     |     | X  |    |
| 11 | Strengthening meteorological services                              | X       |      |     |     |    |     | X   |     |    | X  |
| 12 | Diversification into aquaculture, poultry and other options        |         |      |     |     | X  |     |     | X   |    | X  |
| 13 | Promoting guidelines for using alternative medicine                |         |      |     |     | X  |     |     |     | X  | X  |
| 14 | Soil conservation practices  | X       |      |     |     |    |     | X   |     |    | X  |
| 15 | Increasing agriculture extension activities                        |         |      |     | X   |    |     |     | X   | X  |    |
| 16 | Protecting the seashore using integrated coastal management        |         |      |     | X   |    | X   |     |     | X  |    |
| 17 | Introducing preventive measures to restrict malaria transmission   |         | X    |     |     | X  |     |     | X   |    |    |
| 18 | Growing soybean, yams, and sunflowers; market gardening            | X       |      |     |     |    |     |     |     |    | X  |
| 19 | Moving herds along the rivers to find better fodder during drought | X       |      |     |     | X  |     |     |     |    |    |
| 20 | Safeguarding local species by incorporating them in agroforestry   | X       |      | X   |     |    |     |     |     |    |    |
| 21 | Growing crops sensitive to fungal diseases in low rainfall seasons | X       |      |     |     |    |     |     |     |    |    |
| 22 | Conserving genetic resources                                       | X       |      |     |     |    |     |     |     |    |    |
| 23 | Changing eating habits by reducing number of meals per day         |         |      |     |     |    |     |     |     |    | X  |
| 24 | Launching environmentally sound investment that foster CDM         |         |      | X   |     |    |     |     |     |    |    |
| 25 | Enforcing antipollution laws and regulations                       |         |      | X   |     |    |     |     |     |    |    |
| 26 | Promoting value-addition for agricultural products                 |         |      |     |     |    |     | X   |     |    |    |

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# Conclusion

- Research institutions continue to churn out novel research findings
  - However, the private sector in most cases are not aware of these findings
  - The challenge therefore is to ensure that the research findings are implemented by the private sector
    - Research findings should be disseminated widely
    - Public – private partnerships *are encouraged*
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