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Integrating environmental considerations in the agricultural policy process: Evidence from Nigeria

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ABSTRACT

Policy processes that design, develop, and implement sectoral policies often leave environmental considerations to a central environmental authority. As a result, the environmental implications and consequences of policies and programs, even when they are explicitly recognized as a part of their mandate, are often ignored at the time of implementation. In this paper, we show how the role of individual, organizational, and system level factors in enhancing the ability of policy actors is crucial in better integration of environmental considerations in policy processes. Using data collected in Nigeria, we develop empirical evidence on such factors so that the sectoral policy process can be improved for environmental outcomes. The results indicate that explicit identification of environmental challenges, better collaboration and communication between research and policymaking, and a combination of the expertise of young analysts with the experience of senior policymakers can improve explicit consideration and follow-up of environmental issues in sectoral policy process. The lessons from this paper are also applicable to the environmental considerations of the current policy roadmap for the promotion of the agricultural sector in Nigeria, the *Agriculture Promotion Policy (APP)*, and to other developing countries attempting implementation of such sectoral policies.

1. Introduction

Over the past 30 years, scholars, policy researchers, and development activists have placed a strong emphasis on considering environmental issues in policymaking (Visseren-Hamakers, 2015; Berkhout et al., 2015; Pollack and Hafner-Burton, 2010; Nilsson et al., 2009). Environmental Policy Integration (EPI) is critical at all levels of the policy process (Hogl et al., 2016; Persson et al., 2016; Bührs, 2009; World Bank, 2005; Weersink et al., 1998). The concept of EPI broadly implies an integration of environmental considerations in all stages of policy making in non-environmental policy sectors (Knudsen and Lafferty, 2016; Homeyer et al., 2009; Sutton et al., 2008; Lafferty, 2002). While EPI was identified as an approach to sustainable development after the publication of Brundtland Commission's Report *Our Common Future* in 1987 (Aguilar-Støen et al., 2016; Persson, 2009; Jordan and Lenschow, 2008; Nilsson, 2005), it became widely recognized in the policy arena shortly thereafter.

In 1992 the United Nations Conferences on Human Environment (UNCHE) placed a strong emphasis on environment protection through environment policy integration in development policy planning. At present, more than 178 countries around the world have made political commitments to include environmental issues in their national development policies, such as national Policy Reduction Strategy papers (UNEP, 2002). As a result, several declarations, statutes, and national policies require that an environment

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dimension be integrated in all government plans and policies (Howes et al., 2017; Connor and Dovers, 2004; UN, 2002). Further, international development goals such as the Millennium Development Goals (MGDs) and more recently the Sustainable Development Goals (SDGs) set by the UN set the global agenda for environmental issues.

More recently, environmental considerations have shifted focus on climate change issues. In fact, even in the SDGs, despite other goals related to environment, goal thirteen focuses on combating climate change by 2020. In response to increasing emphasis placed on environmental concerns and accountability, several methodologies and procedures have been developed to analyze potential environmental consequences of development programs. This includes environmental risk and impact assessments, inter-service consultations, and green budgeting, among others. However, efforts to include environmental considerations rarely go beyond the project plans into actual implementation (Howes et al., 2017; Chaker et al., 2006; Connor and Dovers, 2004; Munasinghe and Cruz, 1996).

Sectoral policies continue to disregard or marginalize environmental concerns over other priorities (Hogl et al., 2016; Nilsson and Eckerburg, 2007; Biermann, 2005; Mäler and Munasinghe, 1996). Thus, environmental considerations are not fully integrated into sectoral policies, creating a large disconnect between the design and implementation of policies and programs. This is partly due to lack of understanding of the role that environmental analysis plays in the public policy process.² It is not clear how an emphasis on environmental consideration at the project and program implementation level translates into policy-making and vice versa. This speaks to the need for further research in this area.

Empirical evaluations of EPI in sectoral policies are needed, particularly in developing countries. Empirical evaluations will help assess the legitimacy of efforts to integrate environmental concerns and understanding of policy makers' awareness on environmental issues. Such evaluations are also important to identify constraints to incorporate environmental concerns into sectoral policies as well as in developing EPI practices. Further, a clear understanding of the phases of policy cycle is useful to investigate commitment and constraints of EPI at each level of sectoral policy processes (Persson et al., 2016; Jordan and Lenschow, 2008). To know drivers of policy change and roles of various policy actors, understanding of the policy process is important (Babu, 2013). Such disaggregated analysis will enable an understanding of how environmental considerations at each level are translated to other levels of policy-making. The literature evaluating EPI is lacking and studies investigating EPI in the non-European context, more specifically in the developing countries are rare (Hogl et al., 2016; Nilsson et al., 2009; Jordan and Lenschow, 2008).

Agriculture sector is most affected by environmental changes and it influences environment in several ways. First, the sector is under tremendous pressure to support growing population with an adequate supply of food. This has led to the over-intensification of agriculture production systems, resulting in several negative environmental consequences, such as soil degradation and erosion, water pollution, biodiversity loss, and deforestation (Irani and Sharif, 2016; Ellis and Pontius, 2010; Goodfray et al., 2010; Moss, 2008; Tilman et al., 2001). Poorly designed agricultural policies and programs that fail to consider environmental impacts are largely responsible for environmental consequences emerging from agricultural activities (Runhaar, 2016; Kivimaa and Mickwitz, 2006; Mäler and Munasinghe, 1996; Clapham, 1980). Consequently, the agriculture sector faces the challenge of increasing food production while reducing its environmental impacts (Runhaar, 2016; Hertel and Rosch, 2010). Understanding the factors and challenges of incorporating environmental analysis in agricultural policy process is critical for enhancing the policy outcomes of both sectors. In addition, building resilient food systems in developing countries also require such considerations (Pandya-Lorch and Yusef, 2014).

In this context, this paper aims to examine how and to what extent environmental concerns are integrated in policy process of agricultural and rural development sector of Nigeria and whether the EPI principle is reflected at different levels of decision-making. Different factors influencing incorporation of environmental consideration in the policy process are analyzed to derive implications for program and policy design. This paper is organized as follows. The next section elaborates on EPI development and its relevance in policy process; Section 3 provides a contextual background on Nigeria, with an overview on environmental challenges faced by agricultural sector and various environmental considerations in agriculture and rural development policies; Section 4 presents the conceptual framework used as the basis for our analysis; Section 5 describes the methodology and econometric model of the study; Section 6 discusses the findings of the analysis; Section 7 lays out some policy implications of the study; The concluding remarks form the last section.

2. Environmental policy integration: development and relevance

Although there is a growing recognition and demand for integrating environmental concerns into development agendas and policies, the term “environmental integration” is less common in development documents and scholarly articles (Runhaar, 2016; Bührs, 2009). It is generally expressed as integrated environmental management, ecosystem management, ecosystem governance, and environment mainstreaming, among others (Persson et al., 2016; Bührs, 2009). Traditionally, managing environmental issues and concerns were considered to be environmental ministry's responsibility entirely, rather than it being a common responsibility across sectors (Runhaar, 2016; Hertin and Berkhout, 2003; Lenschow, 2002a). This resulted in environmental policies offering end-of-pipe solutions (Hogl et al., 2016; Berger and Steurer, 2009; Lenschow, 2002b). However, many social, economic, and environmental issues are intricately linked to one another (WCED, 1987) and cut across sectors, particularly the agricultural sector.

It is well recognized that specific issue-oriented solutions and single sectoral policies contribute to environmental problems both

² The public policy process can be seen as a step or course of action taken by the government to address the particular issue or problem. These steps include the identification of a problem, the formulation of a policy to solve the problem, the implementation of that policy, and the evaluation of whether the solution is working as expected.

directly and indirectly and that well-coordinated, multi-dimensional, and multi-sectoral policies are needed to achieve the goal of sustainable development (Wilson et al., 2017; Briassoulis, 2005). To address this challenge, an environmental policy concept that incorporates environmental perspectives in all levels and sectors of policymaking originated in early 1970s (Runhaar, 2016; Persson, 2009; Herodes et al., 2007; Kivimaa and Mickwitz, 2006). The establishment of the United Nations Environment Programme (UNEP) in 1972 followed by the UNCHE pushed the movement of environmental policy integration. Principle 13 of the Stockholm Declarations, an outcome of UNCHE, states that:

“In order to achieve a more rational management of resources and thus to improve the environment, States should adopt an integrated and coordinated approach to their development planning so as to ensure that development is compatible with the need to protect and improve environment for the benefit of their population.”

Brundtland Commission’s Report *Our Common Future* in 1987 further strengthened this conviction. One of the key messages that came out of this report was that the end-of-pipe approach to environmental policies (for example, treating water pollution with wastewater treatment) would not provide a long-term sustainable solution to environmental problems. It requires a consolidated approach of addressing environmental issues and concerns along with socio-economic developmental issues (WCED, 1987). The views expressed in Brundtland’s Report were further supported by the United Nations Conference on Environment and Development (UNCED) in 1992. The Rio Declarations attributed legal status to the concept of integrating environmental protection in the development process by considering it as one of the principles of international law (Biermann et al., 2009; UN, 1993). Additionally, chapter eight of the Agenda 21, an outcome of UNCED 1992, is entirely dedicated to the integration of the environment and development in decision making (UN, 1993: Chapter 8). The integration of environmental considerations in the policy, planning, and management levels is one of the four thematic program areas identified in chapter eight.

The nexus between environment and socioeconomic development outcomes has been widely discussed across multiple disciplines (Roberts et al., 2016; Barbier, 2010; Sarkar, 2010; Dasgupta, 2008; World Bank, 2008; Lufumpa, 2005). In the context of developing countries, this relationship is often reflected in terms of environment, agriculture, and poverty (Hertel and Rosch, 2010; *The African Society*, 2008). Livelihoods of rural populations in developing countries depends almost entirely on agricultural and natural resources both directly and indirectly (Skoufias et al., 2011; Barbier, 2010). Rapid change in land use, including plantations in marginal lands and clearing of forests, has led to multiple natural habitat loss and environmental problems such as soil erosion and water pollution (Croitoru and Sarraf, 2010; World Bank, 2008). Declining and degrading natural environment and reliance of rural populations on natural resources in developing countries indicate that environment degradation is causally interlinked with rural poverty (Sarkar, 2010; Dasgupta, 2008). It is well recognized that these rural populations are more focused on short-term goals such as increasing yield rather than long-term goals such as sustainability of their production practices. Thus, considering environmental issues along with sectoral development policies is more critical in the context of developing countries.

Integrating environmental consideration while developing agriculture policy is essential since certain policy can have potential implications on health and environment. For example, in India has increased during the past few decades from 66,000 t in 1950–1951 per year to more than 26 million tons in 2009–2010 per year (Mujeri et al., 2012). Since fertilizers are heavily subsidized, excessive amounts are used by farmers resulting in overapplication and decrease in soil health. The imbalanced application of chemical fertilizers in India are widely blamed for decrease in yields, poor soil health, water pollution, and has enormous implications (Fishman et al., 2016). Similarly, using data collected from 1993 to 2003, Thakur et al. (2008), found a statistically significant increase in cancer rates high-pesticide areas. The study addressed other causes such as industrial pollution, tobacco use, and other factors behind these elevated cancer rates in addition to, or instead of, pesticides.

In response to wider acceptance and advocacy of environmental policy integration towards sustainable development, both developing and developed countries have expressed a high level of political commitments. However, current government commitments are mostly in documents and are practiced limitedly. Therefore, the current situation is still far from effective environmental policy integration (Nilsson and Eckerberg, 2007). Sectoral policies, while addressing their specific developmental priorities, either continue to ignore or address few environmental problems they impose (Biermann, 2005; Knill and Lenschow, 2000). Different actors in the same or different sectors add to environmental problems, thereby enhancing the need for multidisciplinary and coordinated programs and policies with environmental considerations. To understand EPI at all levels of decision-making, it is beneficial to know the potential environmental impacts emerging from sectoral policies and programs (Nilsson and Eckerberg, 2007). The following section will highlight the key environmental considerations resulting from the recent agriculture sector policies in Nigeria, such as the Agriculture Transformation Agenda (ATA) and the Agriculture Promotion Policy (APP).

3. Contextual background

This section provides a contextual background to set the stage for our analysis. We first describe environmental issues faced by Nigeria’s agricultural sector. Next, we take stock of environmental considerations in the agriculture and rural development policies.

3.1. Environmental issues in the Nigerian agricultural sector

Nigeria is the most populous country in Africa with a population of roughly 182 million and is growing at the rate of 3% annually (World Bank, 2015). Nigeria recently became the largest economy in Africa after rebasing its GDP in 2014, using 2010 as the base year. Nigeria has abundant and rich agricultural resources, human capital, and diversified natural resource base. However, in recent years Nigeria’s economy is influenced heavily by the global economy due to its dependence on oil exports for most of its revenue.

Global oil prices fell by about 70% between 2014 and 2016 alone. This added further pressure on the revenue side for countries like Nigeria that depend almost solely on oil and gas exports for almost 70% of their revenue. Economic growth in 2015 was 2.97%, down from 6.22% in 2014; this is projected to increase to 5.61% in 2019, with an average growth rate of 5.41% annually (NBS, 2015). In recent years, growth has been driven primarily by the service and agricultural sectors, with almost 70% of the overall growth attributable to both sectors. The growth rate of industrial sector increased slightly in 2014 and dropped in 2015.³

Turning to the agricultural sector, the country's agricultural statistics show the potential of the sector in achieving the country's development agenda, especially in the areas of the UN Sustainable Development Goals (UN-SDGs). According to the National Bureau of Statistics/World Bank General Household Survey report (NBS/World Bank, 2016), agriculture is the most prevalent income-generating activity in majority of Nigerian households. Furthermore, the agricultural sector continues to make important contributions to country's overall GDP and has been a key source of economic growth in recent years. The agricultural sector contributed the most to the nation's overall GDP among the non-oil sectors. In the third quarter of 2016, the sector contributed 28.65% to real GDP which was about 2% higher than its corresponding share in the same quarter in 2015 (NBS, 2016). Such statistics show that the most important source of growth in Nigeria in recent times has been due to agriculture sector. The revitalization and sustenance of the sector are therefore key to the achievement of the Sustainable Development Goals (SDG), particularly those that are focused on poverty eradication and zero hunger.

Agriculture is the mainstay of Nigerian rural economy. Value-added agriculture accounts for an average of 41.70% of GDP (NBS, 2010), and nearly 70% of labor force is engaged in agricultural or resource-based activities (FMARD, 2007). More than 80% of the Nigerian poor live in rural areas (Udofia and Essang, 2015; Kolawole and Torimiro, 2006; Ekong, 1999) and their livelihoods critically depend on natural resources, environment for agriculture, livestock, and other basic requirements (Barbier, 2010; FMEH&UD, 2008; Lufumpa, 2005).

In recent years, there has been renewed effort by the Government of Nigeria to refocus the agricultural sector to ensure sustained improvement in poverty reduction, food and nutrition security, and to achieve the Millennium Development Goals of poverty eradication and zero hunger (MDGs 1 & 2). To this end, the Government of Nigeria vigorously pursued an agricultural strategy, known as the Agricultural Transformation Agenda (ATA) between 2011 and 2015. At the heart of the ATA was the promotion of agriculture as a business, enhancing private sector investment in agriculture, reducing post-harvest losses as well as encouraging value addition. It also sought to enhance access to financial services and markets, especially among the most vulnerable (women and youth), as well as to develop rural infrastructure and institutions (FMARD, 2011). The proponents of the strategy strongly argued that the successful implementation of the strategy would help transform the country from a food import-dependent country to one that can feed its people and also export both raw and processed agricultural products.

In agriculture in Nigeria can be classified in four categories: crop production, animal husbandry, fisheries, and forestry/agroforestry (USAID, 2002). Environmental challenges emerging from the agriculture sector include deforestation, soil erosion, desertification, and land and water pollution (UN, 2005; USAID, 2002). The Nigerian agriculture sector is struggling to meet growing food demand, especially in the expanding urban centers. In response, the sector has intensified agriculture production and increased land used for crop production (Fasinmirin and Braga, 2009). This acquired land comes from areas of less intensive use or unexploited land such as savanna, forest, or swamp (USAID, 2002). Rapid population growth in Nigeria is forcing producers to abandon previous resource management techniques that allowed them to produce enough food for themselves with minimal impact on environment (Omofonmwan and Osa-Edoh, 2008).

Agricultural practices such as shifting cultivation and crop rotation are rarely practiced; monoculture farming with extensive dependence on chemical fertilizers, pesticides, and water to increase production is now more widely practiced in Nigeria (Ehimore, 2009). Intensive farming practices coupled with unsustainable water management have made agricultural lands more susceptible to desertification and erosion (Environmental Resource Management, 2009; Olawumi, 2009). The leaching of fertilizer from agricultural lands to water sources is causing both soil and water pollution (UN, 2001; Osemeobe, 1992). Massive deforestation for fuel wood, logging, and agricultural activities is also creating unfavorable environmental conditions, including soil erosion, desertification, flooding, and reduced capacity of forest carbon sequestration (DFID/ERM, 2009; Omofonmwan and Osa-Edoh, 2008). Okoye (2009) documents that soil erosion causes the greatest loss of gross national product relative to other environmental problems. Since 1995, the area impacted by gully erosion has increased by 18,395 km² (USAID, 2002).

Agricultural mechanization policy in Nigeria has significantly altered soil structure and quality. Mechanization of agriculture through large irrigation schemes, boreholes, and deep artesian wells and injudicious management of these structures has led to water logging and increased soil salinity in some areas.⁴ The impacts of mechanization not only lower the agricultural yields but also lower the capacity of the ecosystem to support the diversity of flora and fauna (Environmental Resources Management, 2009; UN, 2001; Titilola, 2000). Thus, biodiversity loss is one of the most serious environmental problems brought about by agricultural mismanagement in Nigeria. This is an important illustration of how policies from many sectors can have unintended environmental consequences. Farmers in several states of Nigeria practice a pastoral livestock system (Titilola, 2000). The movement of many animals from one corridor to other exerts significant amounts of pressure on soil, rangeland, and woody vegetation, thereby causing soil erosion and desertification, especially during drought periods.

³ Adesugba and Mavrotas (2016a, 2016b) provide further discussion.

⁴ In Nigeria, despite the scarcity of tractors, average horsepower and prices of tractors appear high. These patterns are different from the experiences in other parts of the world where initially tractor horsepower was often smaller, such as Asia, or farmers were better endowed with land and wealth, such as Latin America. In Nigeria, joint ownership of tractors is rare, and formal loans are often unavailable due to high transactions costs – see Takeshima (2016a) and Takeshima et al. (2015) for further discussion. See also Takeshima et al. (2016b) on a recent assessment of irrigation issues in the Nigerian agricultural sector.

Table 1
Environmental Problems Generated from Agriculture.
Source: Adapted from Andersson and D'Souza (2014).

Agriculture practices	Onsite effects	Offsite effects(externalities)	Global effects (externalities)
Intensive agriculture	Soil degradation (salinization, loss of organic matter), water logging, Leaching, and Desertification	Ground water depletion; Agrochemical Pollution; Loss of local biodiversity (natural and agricultural)	Greenhouse gas emissions; Animal diseases; Loss of in situ crop and biodiversity
Extensive agriculture	Nutrient depletion Soil erosion onsite effects, Soil desertification	Soil erosion downstream effects (reservoir siltation); Hydrological change (e.g. loss of water retention in upstream areas); Pasture degradation in common property areas.	Reduced carbon sequestration (storage) from deforestation and carbon dioxide emissions from forest fires; Loss of biodiversity.

As seen in developing countries, particularly those in Sub-Saharan Africa, Nigeria's agricultural sector also typically faces environmental challenges. The table below summarizes the environmental problems emerging from agricultural system (Table 1).

Environmental problems arising from agricultural sector require proper attention and consideration in both national environmental policies as well as agricultural and rural development policies for sustained development. Next section provides an overview of how environmental considerations are addressed in Nigerian agriculture and rural development policies.

3.2. Environmental consideration in agriculture and rural development policies

Broadly, the goals of current agricultural and rural development policies in Nigeria include self-sufficiency in food production, modernization of agricultural production system, generation of employment opportunities for rural people, and development of physical infrastructures in rural areas, and promotion of exports (Babu et al., 2017). All agricultural and rural development policies since 1988 have incorporated similar objectives. The Nigerian government has adopted different strategies to achieve targets of agriculture and rural development, many of which have environmental implications. A host of strategies have been adopted to increase agricultural output including: modernizing agricultural production through adoption of improved technologies and management; adopting improved seeds in farming; increasing productivity of cultivated land; enhancing use of fertilizers; establishing irrigation systems to increase land under cultivation; and among others, increasing aggregate area under cultivation (Titilola, 2000).

In earlier agricultural policy documents, from 1960 to 1989, environmental consequences of agricultural policy, guidelines, and strategies were not discussed and analyzed thoroughly (Osemeobe, 1992). Further, environmental considerations were not accounted for while prioritizing agricultural and rural development goals. However, agriculture policies implemented since 2001 explicitly mention environmental objectives of protecting and improving agricultural land resources, and preserving environment for sustainable agricultural production (FMARD, 2002). Similarly, the National Economic Empowerment and Development Strategy II (NEEDS II), implemented in 2007, aims to address its agricultural development objectives through diversifying the economy, enhancing food security, generating employment, establishing economic linkages, encouraging exports, and reducing poverty (FMAWR, 2009).

One of the major policy thrusts of the NEEDS is to establish a safe and healthy environment that secures economic and social wellbeing of Nigerians on a sustainable basis. NEEDS also includes the "Environmental Renewal and Development Initiative", which embraces the larger goals of taking inventory of Nigeria's natural resources, evaluating environmental damage, designing and implementing restoration and rejuvenations measures, and reducing further deterioration of the environment (for details see Nigeria: National Economic Empowerment and Development Strategy). In addition, NEEDS identifies the role of the private sector to protect environmental resources (air, water, land etc.) and maintain environmental balance. Thus, environmental concerns are a part of broader national goals and agricultural policies in Nigeria in recent years including ATA and APP. Yet, these policies seem to fall short on defining specific strategies to reduce environmental consequences of growth oriented agriculture and rural development.

The National Policy on Integrated Rural Development, implemented since 2001, emphasizes promoting rural productive activities, developing human resources, enhancing rural infrastructure, designing special programs for target groups, and promoting rural community organizations and mobilizations. However, there are no explicit provisions relating to sustainable management of environment or natural resources on which agriculture and rural development depends. In a similar vein, the *Agriculture in the Vision 2020* policy does not identify environmental problems pertaining to agriculture in the list of agriculture related issues and challenges (NPC, 2010:54). Among the sixteen objectives identified by Vision 2020 policy document, only one relates to addressing problems of soil fertility, water pollution, and environmental degradation by 2011. The term environmental degradation is not defined precisely in this document; targets and goals for reducing environmental degradation are not specified; and promotions of sustainable agricultural practices are not discussed in the entire policy.

In 2003, leaders of the African Union made the first Comprehensive Africa Agriculture Development Program (CAADP) declaration as part of New Partnership for Africa's Development (NEPAD in Maputo. This was a major step towards developing a common policy framework for agricultural transformation, wealth creation, food security and nutrition, economic growth and prosperity in Africa. Environment is a key issue across the four pillars of focus for CAADP. Building on this commitment each

participating country developed a National Agriculture Investment Plan (NAIP) to deliver on each commitment. CAADP has been a major continent wide sectoral program, however countries have developed their own programs too. Nigeria is no exception, and the Agricultural Transformation Agenda (ATA) initiated in 2011 is a good example.

The agenda focused on transforming the agricultural sector, with environment considerations forming an important part. In fact, at the time of its conception, environmental and social impacts and benefits of the project were analyzed through a detailed Strategic Environmental and Social Assessment (SESA) in line with the requirements of the Nigerian environmental regulations. The African Development Bank assessed potential negative and environmental impacts of the agenda. Similarly, with the new government's Agriculture Promotion Policy (APP) 2016–2020, environmental considerations have not reduced. However, like previous sectoral policies, targets on environment are unclear.

All agricultural policies in Nigeria are growth oriented; they promote intensification of agriculture using high yielding varieties and breeds, mechanizations, and other modern inputs such as fertilizers and pesticides. Recent policies, particularly after 2000, have made efforts to include environmental concerns in their objectives. However, they lack specific targets for programs and projects to address environmental issues. Further environmental concerns mentioned in agriculture and rural development policy reports are frequently ignored when it comes to implementation. Nigeria's agricultural and rural development sector faces an issue of finding the best approach to attain environmental goals while achieving agriculture growth and rural development. For sustained agricultural and rural development, Nigeria must account for the environmental impacts of its developmental policies (Titilola, 2000). However, in Nigeria, the Federal Ministry of Environment is primarily responsible for addressing environmental challenges faced by the country while other ministries focus on their own targets, ignoring the cross cutting environmental issues (Olawumi, 2009). Furthermore, coordination among the different agencies appears to be a problem when more than one sector is addressing the same environmental issue (Olawumi, 2009).

Environmental analysis or environmental impact assessment are required in paper in Nigeria, however, their execution in practice – before and after the completion of the program and projects – is very limited (Ogunba, 2004). This disconnect between the identification of environmental challenges as a part of policy documents and their implementation largely depends on how such issues are considered in the policy process. Understanding factors that enable policy professionals to include environmental considerations in their analysis and program implementation can help identify the challenges in the policy process.

Next section describes the conceptual framework used to understand factors influencing the inclusion of environmental issues in policies. Through this framework, we consider individual, organizational, and system level characteristics of the agricultural sector at key stages of policy process.

4. Conceptual framework

This section presents the conceptual framework used to examine how and to what extent environmental concerns are integrated in the policy process of the agricultural sector of Nigeria and whether the EPI principle is reflected at different levels of decision-making. Using this framework, we identify different factors influencing the incorporation of environmental consideration in the policy process and derive implications for program and policy design. To achieve desired development outcomes, it is important to understand how policy processes brings change in societies. In EPI's context, we need a better understanding of how policy systems develop and operate to address challenges of environment along with food and nutrition insecurity. How do some policy systems fail while others research desired outcomes more smoothly? We use some of these questions to form the conceptual framework for our analysis.

Studying policy process is increasingly recognized as an approach to improve the effectiveness and efficiency in policy development and program implementation (Sabatier, 2007; 2015; Meier, 1991). There are several reasons for understanding how policies are made, implemented, and revised (Rausser and Swinnen, 2010; Bates and Block, 2010). Firstly, it helps us to understand capacity gaps in the policy system, highlighting areas in which government can divert its limited resources to increase impact of their policies. This is because the nature and speed of policy reforms depends on capacity of individuals and organizations involved in the policy process. Secondly, policy process analysis allows us to understand issues from various perspectives, therefore improving outcomes. Thirdly, it allows us to identify areas in which evidence can be used to improve policy outcomes. Finally, increased evidence can help reducing politicization of policy process, and making it more evidence based. The aim of studying policy process of Nigeria is to identify inefficiencies, capacity gaps, and overlaps that prevent a country to reach optimal outcomes, particularly in the context of environmental degradation.

The most simplistic model for analyzing policy process is the linear model. It involves six sequential stages that move in cycle that repeats itself. The six stages are: agenda setting; policy formulation; stakeholder discussions; implementation; monitoring impact; and policy revision. This top down way of looking at policy process is often criticized for being too simplistic (Babu, 2013; Sabatier, 2007). Subsequently, models such as, the interactive policy process model; multiple stream approach; rational choice model; and learning and diffusion model were developed to give a nuanced perspective on policy processes (Sabatier, 2007; Kingdon, 1984; Court and Young, 2006; Ostrom, 2011). Babu (2013) argues that these models may not be suitable for developing country contexts. The author shows how a combination of elements from each of the existing models can be used to develop a stylized framework. This paper adapts the Kaleidoscope model developed by Resnick et al. (2015) and stylized framework of Babu (2013) to fit the case of Nigeria's agricultural transformation.

To develop a framework to analyze Nigeria's efforts in integrating environment considerations in policy process, we use the Kaleidoscope model as the starting point of our analysis. The model helps in identifying different stages of policy process and stakeholders involved at each point. Table 2 below, shows the different stages of policy process, contextual factors, and key

Table 2

Applying the Kaleidoscope Model in integrating environmental considerations in the policy process of Nigeria.

Source: Based on Resnick et al. (2017) and Babu et al. (2014).

Policy Stages	Determinants of Policy Change	Hypothesis testing in the context of environmental considerations in agricultural policy process	Application to the Nigerian case
Agenda setting	1. Recognized, relevant problem	A relevant problem is identified by a concerned constituency regarding credible evidence or to popular perception	Nigeria is signatory to various international commitments on environmental conservation and has taken a number of steps to incorporate this in its agricultural policy process. (<i>Relevant indicator: envinnap</i>)
	2. Focusing event	A well-defined event focuses public attention on a problem or creates a window of opportunity for policy change	The activities at the global level such as meetings and conferences leading to Paris Declaration was a focusing event during ATA and APP. But they had little influence beyond those who were part of the events. (<i>Relevant indicator: envinnap</i>)
	3. Powerful advocates	Strong individuals, organizations, or companies support a new or changed policy to key decision makers.	The government, particularly FMARD, and international organizations have been advocate for conservation of the environment and biodiversity since 2001. (<i>Relevant indicator: envinnap; policyinv</i>)
Design	4. Knowledge & research	Evidence-based knowledge shapes feasible design	While the importance of evidence based policy is well-understood, Nigeria has limited capacity for knowledge and research in the agricultural sector (<i>Relevant indicator: learnresource, educ, res_univ_dummy</i>)
	5. Norms, biases, ideology & beliefs	Beliefs and biases shape the range of design features that are acceptable	While Nigeria is facing a number of environmental problems, it also has a rapidly increasing population for which agricultural production needs to increase. This dilemma makes it difficult to get all stakeholders on the same page. (<i>Relevant indicator: res_univ_dummy, parastat_dummy, min_dummy</i>)
	6. Cost-benefit calculations	Expected costs and expected benefits (political, economic, social, environmental) determine preferred design.	All policies in Nigeria are assessed on the environmental costs and benefits they may cause. A strategic environmental and social assessment of the ATA was conducted by the African Development Bank in 2013. (<i>Relevant indicator: educ; yearonjob; res_univ_dummy; learnresource</i>)
Adoption	7. Powerful opponents vs. proponents	<ul style="list-style-type: none"> For a policy to be adopted, supporters must be relatively more powerful than opponents. For a policy to not be adopted, opponents must be relatively more powerful than supporters. 	The government and international organizations were committed towards adoption of the ATA and the APP. Both groups were supportive of the environmental issues in general. Yet the inclusion of relevant stakeholders such as CSOs, who had more commitment of environment was limited. (<i>Relevant indicator: educ; yearonjob</i>)
	8. Government veto players	<ul style="list-style-type: none"> For a policy to be adopted, government agents with ultimate decision-making power must be supportive or neutral. For a policy to be vetoed, government agents with ultimate decision-making power must be an opponent. 	Former President Goodluck Jonathan initiated the ATA and current President Muhammadu Buhari has built on the efforts with the APP. However, with time the emphasis on environmental considerations has not increased. (<i>Relevant indicator: min_dummy; policyinv; yearonjob</i>)
	9. Propitious timing	Supporters wait for opportune moments (political, economic, social) to push policy change.	In this case, with the change in government there was very little change in the environmental considerations of Nigeria's transformation agenda (<i>Relevant indicator: envinnap</i>)
Implementation	10. Requisite budget	Government or donors provide fund sufficient to carry out the new policy or program as intended	While there were several agricultural programmatic issues identified for special funding under ATA, no specific requirements were identified either under ATA, or APP. (<i>Relevant indicator: learnresource</i>)
	11. Institutional capacity	Government, organizations, or companies were available and able to practice and manage the new policy or program as it was intended	The institutional capacity of the policy system to deal with environmental issues were weak initially both in ATA and in APP. However, new capacity that were mobilized under ATA such as the leaders of the value chains had considerable understanding of the role of their commodity development plans on the environment and sustainability. (<i>Relevant indicators: univ_dummy; parastat_dummy; min_dummy; learnresource</i>)
	12. Implementing stage veto players	Designated implementers – from the private sector, NGO or local agencies – have both incentives and willingness to implement the policy program	There were no Veto players for Environmental issues, as there was a general recognition of the issues that were important; this was more to do with capacity both human and financial (see the above two hypotheses) (<i>Relevant indicator: educ; gender; agintervention; yearonjob</i>)
	13. Commitment of policy champions	Strong individuals, organizations, or companies continued to publicly support the program	Environmental issues as part of agricultural development process entered though land. Soil, water and energy issues. While land degradation had some champions in the research community, such support was limited in the policy community (<i>Relevant indicator: educ; gender; agintervention; yearonjob</i>)

(continued on next page)

Table 2 (continued)

Policy Stages	Determinants of Policy Change	Hypothesis testing in the context of environmental considerations in agricultural policy process	Application to the Nigerian case
Evaluation & Reform	14. Changing information & beliefs	New learning emerges that impacts how decision makers believe the policy/program should be structured	Due to commodity orientation of the ATA and APP, there were very limited opportunities for learning and information based change in the belief system of these involved in the policy process. (<i>Relevant indicator: educ</i>)
	15. Changing material conditions	Available resources, technology, or policy relevance has changed since the policy was originally implemented	While there has been increases in the allocation of general resources to agricultural sector, there has not been any special effort to reallocate some of this to environmental issues facing agricultural sector. (<i>Relevant indicator: policyinv</i>)
	16. Institutional shifts	New actors enter the policy arena as the result of elections, cabinet reshuffle, or new staffing	More recently the CSOs and Farmer organizations have entered to environmental debates involving agriculture sector. But their presence in both ATA and APP were limited. (<i>Relevant indicator: policyinv</i>)

determinants of policy change in the context of ATA and APP initiated in Nigeria in recent years.

Using this framework and select set of parameters of the Kaleidoscope model, we develop an understanding of the policy process of Nigeria's food and agricultural sector and analyze the extent to which environmental considerations are considered. We use extant data to understand the level of policy involvement and capacity of professionals working in key institutions involved in the policy process. Further, we also understand how environmental issues translate at the time of implementation. This analysis will help us in identifying capacity and institutional gaps in the policy process, and inform possible corrections to fill them. Building on this framework, next section presents our data collection methodology and the model specification used to develop our results.

5. Methodology

5.1. Data

The paper uses an extant dataset collected through a survey of professionals in Nigerian public sector, conducted in collaboration with the Federal Ministry of Agriculture and Rural Development (Sanyal and Babu, 2010). Several consultative meetings with stakeholders and workshops helped to identify the government institutions, public financial institutions, research institutes, and universities that are involved in agricultural policy process. The selected institutions belong to Abuja (Federal Capital), Oyo, Kaduna, Enugu, Ogun, Benue, and Abia states of Nigeria. Data was collected from a random sample of professionals working in these purposively selected institutions. A total of 320 individual questionnaires were administered yielding 183 individual responses. Questionnaire included information on respondents' professional background, level of involvement in agricultural and rural development policy process and other relevant information, such as individual experiences and satisfaction with agriculture and rural development policy process, institutional incentives available to the respondents, and whether the individual includes environmental issues and analysis in their work.

In this study, three groups of explanatory variables are considered. First group includes variables representing individual attributes - such as gender, education level, job experience, individual ability to consider environmental analysis/issues in work, and individual's level of involvement in agriculture and rural development policy process. The use of education could have potential not endogeneity problem; However, in Nigeria's context, this was not an issue since a lot of employees do not have a PhD. The variable education was used as a categorical variable since in the context of Nigerian ministry, education was not directing related to number of years of experience.⁵ Second group includes individual's perception to organization culture. This includes individual's perception to income security, job security, resource availability, performance appraisal system, and so forth. Third group includes variables on enabling environment- such as whether environmental issues affecting agricultural development are treated as part of agricultural policy, whether the government reviews and amends existing policies in agriculture and rural development to include environmental sustainability in agriculture, and government's effort to improve environmental sustainability in policy process. Variables such policy stages were not added as dummies since we used cross section data. However, for future research, policy stage variables could be added as dummies if time series data is available.

Table 3 provides an overview of descriptive characteristics of respondents. Most of the respondents (79%) were male. This indicates a gender imbalance within the agricultural policy process in a nation in which the population is nearly split evenly between the genders (National Census, 2006). Approximately, 14% of professionals are engaged in designing and developing a policy while 60% of individuals reported to be involved in implementation or and monitoring and evaluation of agricultural policies. Remaining 26% are involved in activities other than design, development, implementation, and monitoring and evaluation activities of the policy process. Most of the professionals in the policy process have an advanced degree. Nearly 46% of individuals have masters' degrees while 26% have PhDs. Around 26% of individuals have bachelors' degree. Only 1.47% have diploma. Around 55% of the

⁵ An employee with a bachelor's degree could have more number of years of experience compared to a recent PhD graduate student in policy work.

Table 3
Descriptive characteristics of the sample.
Source: Authors.

Variable	N	Environmental issues/analysis at work	
		Yes	No
Gender	141	111 (78.72 [♀])	30 (21.28)
Male	112 (79.43)	88 (78.57)	24 (21.43)
Female	29 (20.57)	23 (79.31)	6 (20.69)
Policy Involvement	129	104 (80.62)	25 (19.38)
Designing	14 (10.85)	13 (92.85)	1 (7.14)
Developing	4 (3.10)	4 (100)	0 (0)
Implementation	53 (41.08)	42 (79.24)	11 (20.75)
Monitoring	24 (18.60)	20 (83.33)	4 (16.66)
Others	34 (26.36)	25 (73.52)	9 (26.47)
Type of Institution	140	110 (78.57)	30 (21.43)
Research and University	77 (55)	64 (83.12)	13 (16.88)
Parastatal	43 (30.71)	34 (79.07)	9 (20.93)
Ministry	20 (14.29)	12 (60.0)	8 (40.0)
Agriculture and rural development intervention programs awareness	133	105 (78.95)	28 (21.05)
Yes	125 (93.98)	101 (80.80)	24 (19.2)
No	8 (6.01)	4 (50.0)	4 (50.0)
Education	136	108 (79.41)	28 (20.59)
Diploma	2 (1.47)	2 (100)	0 (0)
Bachelors and HND	36 (26.47)	29 (80.55)	7 (24.13)
Master Level	63 (46.32)	48 (76.19)	15 (23.80)
PhD	35 (25.73)	29 (82.85)	6 (17.14)
Average job experience	141	13.26 [*]	

Notes:

* indicates mean.

♀ Numbers inside parenthesis indicate percent.

professionals are associated with research institutes and universities; 31% of the individuals are affiliated with parastatal organizations; remaining 14% are working directly with ministry of agriculture. The professionals interviewed have an average job experience of 13.26 years.

Although the magnitude of difference between percentage of male and female professionals undertaking environmental analysis in their work is small, in this sample female professionals tend to consider environmental analysis more than male professionals. The tabular analysis presented in Table 3 also shows that professionals involved in implementation are relatively less involved in environmental analysis as compared to the professionals involved in designing and developing policies. Similarly, professionals involved in monitoring and evaluation undertake less environmental analysis compared to professionals involved in design and development of policies. It should be noted that in this sample, professionals in research institutions and universities consider environmental analysis more in their work compared to professionals in parastatal organizations and the ministry.

In summary, the sample characterizes the well-educated professionals with good amount of job experience affiliated with research, institutions, university, parastatal organizations and the ministry, and are engaged in one or more phases of the policy process.

5.2. Model specification

In this paper, we use a logit regression model to explain environmental considerations in the work of professionals involved in agricultural policy process. A large body of literature recognizes linear regression to be inappropriate when the dependent variable is binomial (Agresti, 2010; Wooldridge, 2009; Kleinbaum et al., 2007). The assumption of a linear relationship between the dependent variable and the explanatory variable, and the homoscedastic error term in ordinary least square regression (OLS) may not hold when there are only two categories for the dependent variable. Furthermore, OLS with binomial or dichotomous dependent variable will predict values outside the actual range of dependent variable. Since the dependent variable of this study is dichotomous (yes/no), this paper uses the logit model for data analysis. The dependent variable will be a yes/no question in which yes is coded as "1" - meaning that individual incorporates environmental issues/analysis in his/her work - and no is coded as "0".

Let Y_i denote an unobserved, continuous dependent variable, X_i be an observed independent variable, ε_i be a logistically distributed error term and is uncorrelated with X , and β be a slope parameter to be estimated for an observation i . Further, let Y_i^* be the observed binary variable where:

$$Y_i^* = \begin{cases} 1 & \text{if the } i\text{th individual could include environmental issues/analysis in work} \\ 0 & \text{otherwise} \end{cases}$$

Then a regression model will be:

Table 4
Definition of variables and their descriptive statistics.
Source: Author's calculations.

Variables	Variable type	Description	Med	Mode	Mean	Std	Range
Envanalysis (dependent variable)	dummy	= 1 if individual can incorporate environmental issues otherwise 0	1	1	0.82	0.38	0–1
<i>Individual characteristics indicators</i>							
Educ	categorical	Highest education level: 1. Diploma 2. B.Sc and HND 3. Masters and equivalent 4. PhD	3	3	2.95	.757	1–4
Gender	dummy	= 1 if female otherwise 0	0	0	0.20	0.40	0–1
Policyinv	categorical	Individual's involvement in the policy process- 5. Design, 4. Development, 3. Implementation, 2. Monitoring and Evaluation, and 1. Other	3	3	2.52	1.18	1–5
Agintervention	dummy	= 1 if individual is aware about agriculture/rural development program, otherwise 0.	1	1	0.97	0.17	0–1
Yearonjob	continuous	Experience on job	14	15	13.61	8.49	1–32
<i>Enabling environment indicators</i>							
Envinnap	dummy	= 1 if environmental issues that affect agricultural development treated as part of the National Agricultural Policy otherwise 0	1	1	0.64	0.48	0–1
<i>Organization culture indicators</i>							
res_univ_dummy	dummy	= 1 if individual belong to research institutes or university, otherwise 0	1	1	0.51	0.50	0–1
parastat_dummy	dummy	= 1 if individual belong to parastatal organization, otherwise 0	0	0	0.33	0.47	0–1
min_dummy	dummy	= 1 if individual belong to ministry, otherwise 0	0	0	0.16	0.37	0–1
Learnresource	categorical	Individual is given adequate learning resources to carry out his duties. 1. Strongly disagree, 2. Disagree, 3. Not sure, 4. Agree, 5. Strongly Agree	2	2	2.53	1.33	1–5

$$Y_i^* = \beta X_i + \epsilon_i \tag{1}$$

where X_i is vector of independent variables describing enabling environment, individual characteristics, and organizational or institutional culture. Thus, we will estimate the slope parameters β in this model. They denote the effect of a unit change in independent variable X on the dependent variable. The probability associated with the binomial dependent variable in a logit model is:

$$p(Y^* = 1|X_i) = \left[\frac{e^{\beta X}}{(1+e^{\beta X})} \right] \tag{2}$$

The parameters β are estimated by maximum likelihood (Agresti, 2010; Wooldridge, 2009; Kleinbaum et al., 2007).

6. Results and discussion

Table 4 below presents definition and descriptive statistics of only those variables which are included in final models. Given the binomial and ordinal nature of data for majority of variables, median and mode (not mean) are appropriate measures of central tendency. It is clear from Table 4 that distributions of *envanalysis* (dependent variable) and other variables including *learnresource*, *envinnap*, *parastat_dummy*, *min_dummy*, *gender* are skewed. Median level of education is masters' degree and average years of job experience is 13.61 in the final sample defined for running the model.

Dummy variables are included in the model for three types of organizations from which the respondents belong: research and university, parastatal, and ministry. Purpose of the institutional dummy variable is to explain variations in organizational culture of between different institutions. Controlling for gender allows us to examine the behavior of male and female professionals in integrating environmental concerns in their work. Relevant information on agricultural and rural development programs and knowledge of possible environmental consequences emerging out of these programs may be a triggering factor to incorporate environmental analysis. This effect is captured by a dummy variable *agintervention*, which is a measure of respondent's awareness of agriculture and rural development intervention programs. Further, individual's role and responsibilities in policy process can be a crucial factor in their ability to integrate environmental analysis as part of their job responsibilities. Respondent's roles and responsibilities are categorized in the variable *policyinv* below. Table 4 provides descriptions of these dummy variables and their corresponding codes.

Professionals associated with the design and development of agricultural policies may have a better opportunity to include environmental analysis than professionals involved in implementation. Similarly, professionals involved in monitoring the policies and/or programs, since the later set of activities are undertaken after the policies are announced, may also have a better opportunity to include environmental analysis. This effect is controlled in the models through a categorical variable *policyinv* which includes: design, developing, implementation, monitoring and evaluation, and other activities (which are related to policy process but do not fall in the above four categories). It should be noted that resource availability and accessibility are crucial factors for undertaking any job responsibilities. Among several indicators of resources, availability of learning resources is one. We use this indicator to explain its effect on incorporating environmental analysis in policy professionals' work. Other two explanatory variables, *educ* and *yearonjob*, could influence professionals to include environmental analysis in their work. We controlled for several other variables representing organizational culture of the institution and the overall enabling environment, which includes performance evaluation system, and

Table 5
Econometric Results.
Source: Authors.

Variable	Model 1	Model 2
envinnap	1.678(0.785 [∇])**	1.993(0.942)**
res_univ_dummy	3.539(1.113)***	3.185(1.192)***
parastat_dummy	1.548(0.951)*	1.342(0.994)
agintervention	3.517(1.488)**	3.020(1.478)**
Policyinv	2.333(1.194)**	0.932(0.436)**
learnresource	0.549(0.302)*	0.507(0.313)*
Gender	2.333(1.194)**	1.765(1.177)
Yearonjob	–	– 0.079(.0484)*
Educ	–	0.015(.555)
Constant	– 8.245(2.441)	– 6.794(2.794)
N	100	100
LR chi ²	29.85	33.01
Prob chi ²	0.0001	0.0001
Log Likelihood	– 32.216	– 30.636
Pseudo R ²	0.317	0.350
AIC	80.430	81.272
BIC	101.272	107.324

Note: ***, **, * denotes significance at 1, 5, and 10% respectively.

gender in second model is significant at 13%.

[∇] Standard errors are in parentheses.

political interference in undertaking job responsibilities. These variables are not found to influence the model significantly and are not discussed here. Table 5 below present results from the logit model.

First, in both models, we find *envinnap* significant at 5%. This indicates that when environmental issues affecting agricultural developments are treated as a part of the broad national agricultural policies, probability of incorporating environmental analysis in job responsibilities and work assignment increases. Thus, to trigger environmental analysis and discussions at each level, environmental concerns and issues need be first embraced by broader policies relating to agricultural development. Second, we find that *res_univ_dummy* significant at 1% level in both models. The probability of undertaking environmental analysis increases when professional belong to a research and/or university system rather than a federal ministry. The variable *parastat_dummy* is significant in the first model at 10%. It shows that professional belonging to parastatal organization are more likely to incorporate environmental analysis in their work than professionals belonging to the ministry. In both models, we find the variable *agintervention* significant at 5% level, indicating that when professionals are well-informed about agricultural and rural interventions, probability of undertaking environmental analysis increases. In the first model, gender variable is significant at 5%. This shows that female professionals are more likely to undertake environmental analysis than male professionals.

Additionally, we control for the effect of two more variables in the second model: *educ* and *yearonjob*. The variable *educ* is not significant which is not expected. Association between *educ* and dependent variable is positive, it shows that having advanced education helps in undertaking environmental analysis. The variable *yearonjob* is negatively significant at 10%. This is one of the expected results. Young people are more likely to undertake environmental analysis since they are generally more aware of environmental issues than older people. Further, environmental education and policy integration became a hot topic only after 1992 in the global arena. Therefore, more experienced professionals may not be sufficiently exposed to environmental education and methodologies of environmental assessments, particularly in the context of developing countries. In addition, younger professionals may greater methodological know-how and are more inclined to undertake environmental analysis. Two variables, *parastat_dummy* and *gender*, lost their significance when *educ* and *yearonjob* are added to model 2. Based on Akaike information criterion (AIC), the first model statistically best fits the data.

7. Policy implications

While most studies on environmental policy integration pertain to developed countries, this paper adds value to the literature on EPI by providing a contextual result related to sectoral policies of a developing country. In doing so, this paper seeks to understand factors influencing the incorporation of environmental analysis in agriculture and rural development policy process in Nigeria. We apply the Kaleidoscope model for policy process analysis, and use survey data on agricultural and rural development professionals from selected institutions (Resnick et al., 2015). The results show that several factors significantly influence the incorporation of environmental analysis in the work of professionals who are involved in policy process. Based on the Kaleidoscope model and our data analysis, we derive several policy implications. The model provides a framework for policy analysis that can be used to ensure better integration of environmental considerations in agricultural policies.

In Nigeria, environmental issues are often considered at agenda setting stage of the Kaleidoscope model. Environmental issues are well recognized and have some powerful advocates, but there are few focusing events at the national level to drive the agenda. Due to this there is little motivation to follow through on environmental considerations of policies.

For environmental issues and concerns to be taken seriously throughout the policy process, it is necessary that broader policy documents recognize these issues explicitly. Therefore, environmental issues should be considered at the design stage. The Environmental Assessment Act No. 86 of 1992, mandates all major policies undergo an Environmental Impact Assessment, however, there is little follow-up after the first assessment is completed.

When agricultural policy leaders make commitments to develop or facilitate EPI in broad development strategies and policy documents, this increases probability of incorporating environmental analysis. Empirically, very little evidence is available to support this argument but several authors have alluded to the interconnection between the broad policy statements and incorporation of environmental issues and analysis in planning and program development (Nilsson and Eckerburg, 2007; Persson, 2004; Keeley and Ian, 2000). Therefore, policy champions can play a major role in pushing and following through the environmental agenda.

Another major factor that influences incorporation of environmental analysis in the agriculture and rural development policy discussion relates to the organization culture of key institutional actors in the policy process. It is expected that professionals from academic and research institutions are more likely to incorporate environmental analysis compared to public sector organization. In our study both models show that professionals who are associated with research institutes and universities are more inclined to undertake environmental analysis as a part of their policy analysis work than the professionals associated with the ministry. In most developing countries, the practice of evidence-based policymaking is rare (Hansohm, 2007, 2002). The lack of evidence-based policymaking indicates a lack of consultation and coordination between academic and research institutions and the policy decision-making organizations. The distinct organizational culture between academic and research institutions, and public sector organizations indeed play a significant role in determining environmental analysis to be taken into consideration in professionals' work. This finding points to the need for regular consultative efforts between public sector policymakers and professionals in academic and research institutions. Further, it also calls for organizational transformation in public sector toward incorporating environmental consideration in their procedural work, which is needed for effective integration of environmental issues in sectoral policy discussions. These efforts would help in the adoption stage by developing powerful opponents and proponents to environmental considerations, initiating healthy debate in the policy process. Further, this would also help in building institutional capacity at the implementation stage of the policy process.

Broad understanding of agricultural interventions and their possible environmental consequences will enable to integrate environmental analysis in the policy process. Both the models in this study show that a knowledge of agricultural and rural development programs significantly influence the undertaking of environmental analysis. It suggests that information sharing about different agricultural and rural development interventions and discussions on possible environmental consequences should be facilitated and encouraged in the broad policy framework and among stakeholders. Here too, key focusing events at the agenda setting stage involving various stakeholders are important in order to get greater commitment on environmental issues.

While integration of environmental perspectives and concerns is important at all levels, a professional's ability to conduct environmental analysis effectively in the policy process also depends on his or her role in the policy process. People who are involved in implementing, and monitoring and evaluation are less likely to have the opportunity to incorporate environmental analysis compared to the ones who are involved in designing and developing policies, plans, and programs. In our study, both the models show that professionals who are involved in the higher level of policy-making process are more likely to undertake environmental analysis. It indicates that a conducive environment, particularly from the point of EPI in sectoral policies, is needed.

Environmental consideration and analysis undertaken during design and development phase may not trickle down to the implementation phase when people at lower levels of policy process are not likely to undertake environmental analysis. Therefore, it calls for a special intervention in sensitizing people involved in the lower level policy process, mainly at the implementation, and monitoring and evaluation stage, about environmental issues that may emerge from policy interventions, importance of mainstreaming environment in the policy process, and methodologies for implementing environmental analysis.

Young and environmentally sensitized people are more likely to include environmental analysis as a part of their work. Integrating environmental perspectives at all levels and processes picked a height after Rio Declarations in 1992. Environmental education programs were also prioritized as part of the development agenda after the Rio Declarations. Further, young people are more likely to be equipped with environmental analysis skills than older people because of their exposure to recent curriculum and course contents. Implication of this finding is that a team of junior and senior professionals should be formed to facilitate environmental analysis in an organizational setting. Experiences of senior professionals need to be backed up with expertise of young and innovative professionals in the policy process. Similarly, the results also suggest that women professionals are more likely to undertake environmental analysis than the male professionals. However, this finding should be generalized with caution and needs further research.

8. Concluding remarks

Incorporating environmental considerations in sectoral policy processes continue to be a challenge for several developing countries. A major challenge to agricultural development in Sub-Saharan Africa is the lack of understanding of roles of actors in policy process and drivers of policy change. Understanding factors that facilitate integrating environmental issues and analysis at the individual, organizational, and systems level is a first step in addressing this challenge. This paper attempts to identify role of these factors using the Kaleidoscope model and survey data collected from professionals in the Nigerian agricultural sector. We use the Kaleidoscope model as it provides a framework to understand policy process of countries. In this paper, it helps in analyzing key gaps due to which environmental considerations, despite being in policy documents have no real effect on ground.

Results seem to indicate that explicit mentioning of environmental issues and potential consequences of policies and programs, as

a part of policy and strategy document is a necessary step. However, this may not be sufficient for integrating environment considerations into other stages of the policy process, particularly implementation. While researchers are likely to analyze environmental challenges as a part of their work, integrating their research results into policy process will require strategic collaboration with their counterparts in the policy-making organizations such as the parastatal and the government ministries. Such collaboration needs nurturing and should be a part of enhancing the policy process with evidence-based debate and dialogues. Young professionals are likely to be environmentally conscious and more skilled in integration environmental issues in their work and yet they may lack the needed experience to bring the results of their work into the policy debate. Their collaboration with senior policy makers, who could mentor them, would increase the chances of addressing environmental considerations at the sectoral level. Further research is needed to explore other institutional and organizational factors that could facilitate greater integration of environmental considerations in policy process.

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