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Patterns of Change in Rice Production in Africa: Implications for Rice Policy Development



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Introduction

Rice is one of the most important and strategic commodities in Africa. It is consumed widely in all countries and sub-regions of the continent and is cultivated in almost all African countries under diverse ecosystems and a wide variety of climatic and soil conditions (rain-fed lowland, irrigated low land, mangrove swamp, upland, etc). During the December 2006 Abuja Summit on Food Security in Africa, African Heads of State and Government (HSG) identified rice, among other crops¹, as a continent level strategic commodity for food security and poverty reduction and called on African countries, Regional Economic Communities (RECs), the African Union Commission (AUC) and the New Partnership for Africa's Development (NEPAD) to protect and promote rice production on the continent. They also called on the AUC and NEPAD to facilitate the attainment of continental self-sufficiency in rice production by 2015 (AUC, Resolution of the Abuja Food Security Summit, 2006).

African people consume more rice than what is produced on the continent. During 2001 – 2003, milled rice production in Africa averaged 11.80 million tons (17.59 million tons paddy equivalent) per annum whereas consumption averaged 15.27 tons (22.90 paddy equivalent) per annum. Africa imported on average, 5.24 million tons per annum, valued at US\$1.13 billion to meet the deficit in consumption. Rice imports have grown significantly at an average annual rate of 6.3% per annum from 4.15 million tons in 2000 to 6.12 million tons in 2007.

¹ The other commodities of strategic importance include legumes, maize, cotton, oil palm, beef, dairy, poultry and fish.

The share of imported rice relative to total rice consumption now stands at about 34%. Many African countries have made significant strides to increase rice production and reduce imports. These efforts have however not succeeded and the import bill continues to increase, draining the continent's meager financial resources that would otherwise be invested in other productive sectors.

The call from African Heads of State and Government to facilitate continental self-sufficiency in rice production has implications for the Regional Economic Communities (RECs) because these are the building blocks for Africa's regional and continental integration. It also has implications for national, sub-regional and continental research organizations (NARS, SROs and FARA) because these are the technical institutions responsible for developing and disseminating appropriate agricultural technologies for increasing rice production in Africa.

This brief looks at changing patterns of rice production in Africa, categorized by regional economic community, in response to the need for regional policies and initiatives that complement and leverage on national rice development efforts. It analyzes aggregated trends in production, area harvested and yields in rice production in six RECs (AMU, CEN-SAD, COMESA, ECCAS, ECOWAS, SADC)².

² **AMU** – Arab Maghreb Union: Algeria, Libya, Mauritania, Morocco, Tunisia; **CEN-SAD** – Communauté des États Sahélo-Sahariens Arabic or Community of Sahelo-Saharan States: Benin, Burkina Faso, Central African Republic, Chad, Djibouti, Egypt, Eritrea, Gambia, Libya, Mali, Morocco, Niger, Nigeria, Senegal, Somalia, Sudan, Togo, Tunisia; **COMESA** – Common Market for Eastern and Southern Africa: Burundi, Comoros, DR Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, Zimbabwe; **ECCAS** – Economic Community of Central African States: Angola, Burundi, Cameroon, Central

Individual country data for member states of each REC are aggregated into sub-regional data to establish trends in production, acreage and yields. Changes in these parameters are used to (i) determine the magnitude of effects attributable to each and (ii) analyze the implications for rice policy development in Africa.

Patterns of change in rice production

Patterns of change in rice production in Africa over the last two decades (1986 – 2006) are analyzed as a basis for identifying policy options for rice sub-sector development. The analysis covers each of the above RECs whereby national data on rice production, area harvested and yield in each member state of the REC are aggregated into sub-regional data. Continent-wide aggregations³ are complemented with similar sub-regional analyses to demonstrate the diverse patterns of change in rice production in Africa. A ‘decomposition’ method⁴ is used to analyze the absolute and relative changes in total rice production, attributable to changes in area harvested and yields. Changes in rice production during the period 1986 – 2006 are decomposed into three effects, two primary effects involving area harvested (acreage) and yield (productivity) and one interaction effect. To isolate periods of real impact, the twenty-year period is divided into two ten-year periods, 1986 – 1996 and 1996 – 2006.

The acreage effect is the change in rice production due to a change in the area harvested, holding constant the yield per hectare, while the productivity effect is the change in rice production due to a change in yield holding constant the area

harvested. The interaction effect describes the change in rice production resulting from simultaneous changes in area harvested and yield. The interaction term may be positive or negative, depending on changes in the underlying variables during the period 1986 – 2006.

Using FAO statistics (<http://www.faostat.fao.org>), absolute and relative shares of each effect in the total change are calculated and used to compare, across sub-regions, the impact, and therefore the contribution, of each factor to changes in rice production in Africa. The analysis highlights the importance and magnitude of each factor and therefore underscores the need for policy options to address each of them.

Production Trends

By world standards, Africa is a minor player as far as rice production is concerned. The region with the largest production of paddy rice in the world is Asia with 584 million tons in 2006. This represents over 90% of total world production. Africa produced approximately 21.9 million tons⁵ of paddy rice in 2006 (Table 1). This represents 2.5% and 2.7% of world and Asian production respectively. Paddy rice production grew at 4.3% per annum from 10.1 million tons in 1986. Annual growth averaged 4.8% between 1986 and 1996 but declined to 3.7% per annum between 1996 and 2006.

Sub-regional analysis of paddy rice production reveals that COMESA and CEN-SAD are the main rice-producing RECs in Africa. Bearing in mind multiple REC memberships, Member States of these two RECs produce more than 75% of the total quantity on the continent. Rice production within the COMESA region rose from 5.7 million tons in 1986 to 8.3 million tons in 2006, registering a 4.0% annual growth (Table 1 and Fig. 2). During 1986 – 1996, annual growth in production averaged 5.2%. Growth during the decade after declined to 3.1% per

African Republic, Chad, Gabon, Congo, DR. Congo, Equatorial Guinea, Sao Tome and Principe; **ECOWAS** – Economic Community of West African States: Benin, Burkina Faso, Cape Verde, Cote d’Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo; **SADC** – Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe.

³ This recognizes and takes account of multiple-REC membership by some countries.

⁴ See Tambi and Maina for details on the method of analysis used.

⁵ Annual average production for 2005, 2006 and 2007.

annum. CEN-SAD is the next REC with a total production of 8.2 million tons in 2006, up from 4.5 million tons in 1986. Rice production in the CEN-SAD region grew at 8.5% per annum during 1986 – 1996 but declined to 4.0% during 1996 – 2006 (Fig. 1).

Paddy rice production within the ECOWAS region was estimated at about 6.0 million tons in 2006, having increased from 4.2 million tons in 1986 at a growth rate of 4.4% per annum. Annual growth averaged 5.5% during 1986 – 1996 and 3.5% during 1996 – 2006. Production within the SADC region rose from 3.2 million tons in 1986 to 3.7 million tons. Annual growth in production was minimal, averaging 2.8% per annum during 1986 – 2006. The ECCAS and AMU regions account for less than 4% of total production with estimated quantities of 565,000 tons and 98,000 tons respectively. In the AMU region, production stagnated at 62,000 tons between 1986 and 1996 but increased thereafter at 12.4% per annum.

Table 1. Average paddy rice production in Africa between 1986 and 2006, categorized by Regional Economic Community.

Region	Rice Production (1,000 tons) ^a			Growth rate (%) per annum		
	1986	1996	2006	1986 - 1996	1996 - 2006	1986 - 2006
Africa ⁶	10,071	15,774	21,892	4.81	3.74	4.29
AMU	62	62	98	8.81	-0.09	12.35
CEN-SAD	4,509	6,952	8,268	8.45	4.03	6.06
COMESA	5,683	6,870	8,345	5.18	3.13	4.01
ECCAS	460	589	565	2.28	0.82	1.51
ECOWAS	4,191	6,047	5,977	5.53	3.52	4.36
SADC	3,198	3,615	3,662	1.96	4.05	2.83

^a 1986 = average for 1985, 1986 and 1987; 1996 = average for 1995, 1996 and 1997; 2006 = 2005, 2006 and 2007.

Figure 1: Rice Production in AMU, CEN-SAD, and ECOWAS, 1985 - 2007.

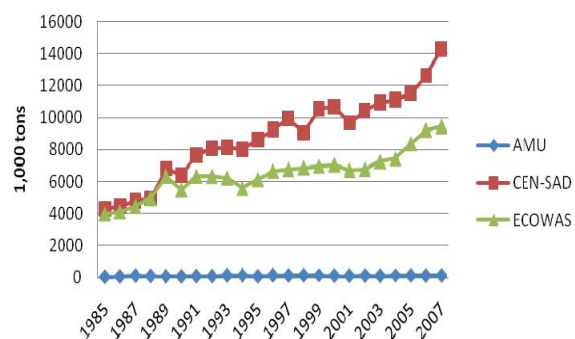
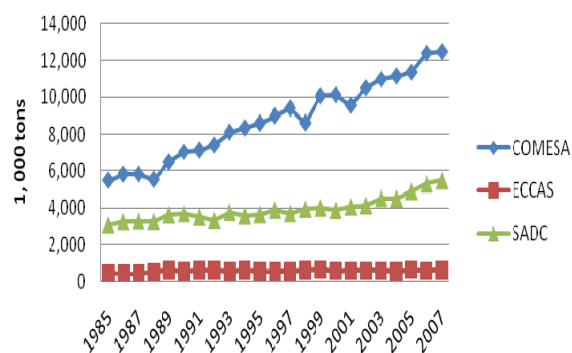


Figure 2: Rice Production in COMESA, ECCAS, and SADC, 1985 - 2007.



⁶ The total for regional economic communities does not add up to the total for Africa because of multiple REC membership.

Trends in Area Harvested and Yields

Africa harvested 9.2 million hectares of rice in 2006 (Table 2). This represents 6.0% of the total area harvested in the world and 6.6% of the area harvested in Asia. The total area harvested increased by 3.0% per annum from 5.1 million hectares in 1986 to 9.2 million hectares in 2006. Between 1996 and 2006, growth slowed down to 2.4% per annum.

In the ECOWAS and CEN-SAD regions⁷, 5.8 million and 4.2 million hectares of rice were harvested in 2006, up from 2.6 and 1.5 million hectares in 1986 respectively (Fig. 3). The highest annual growth in area harvested occurred in the AMU region (11.2%) in spite of the small total area harvested. The rate of growth of harvested area has been faster in the CEN-SAD and ECOWAS regions (averaging 5.8% and 4.1% respectively) than in the COMESA, ECCAS and SADC regions where growth has been minimal, and averaging less than 2% per annum (Table 2 and Fig 4).

Table 2. Harvested rice area in Africa between 1986 and 2006, categorized by Regional Economic Community.

Region	Area harvested (1,000 ha) ^a		Average annual % growth rate (1986 – 2006)
	1986	2006	
Africa	5,114	9,208	3.04
AMU	12	21	11.21
CEN-SAD	1,511	4,166	5.76
COMESA	2,472	3,475	1.84
ECCAS	454	589	1.43
ECOWAS	2,629	5,823	4.07
SADC	1,995	2,632	1.55

^a The total for regional economic communities does not add up to the total for Africa because of multiple REC membership

⁷ Of all the regional economic communities considered, CEN-SAD and ECOWAS share the largest number of countries with multiple REC membership.

Figure 3: Rice area harvested in AMU, CEN-SAD, and ECOWAS, 1985 - 2007

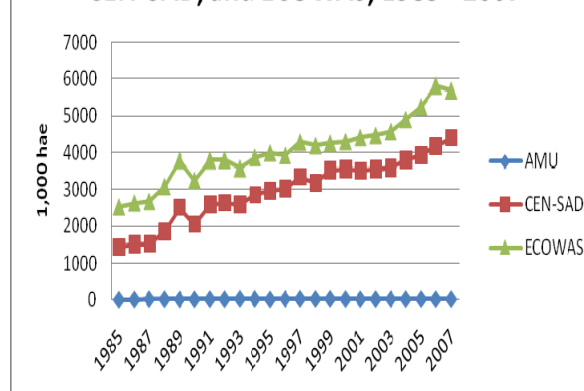
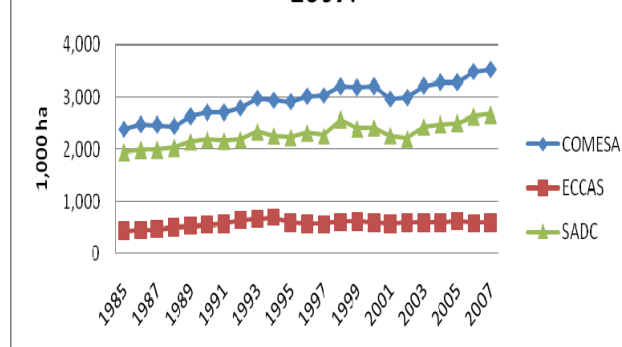


Figure 4: Rice area harvested in COMESA, ECCAS, and SADC, 1985 - 2007.

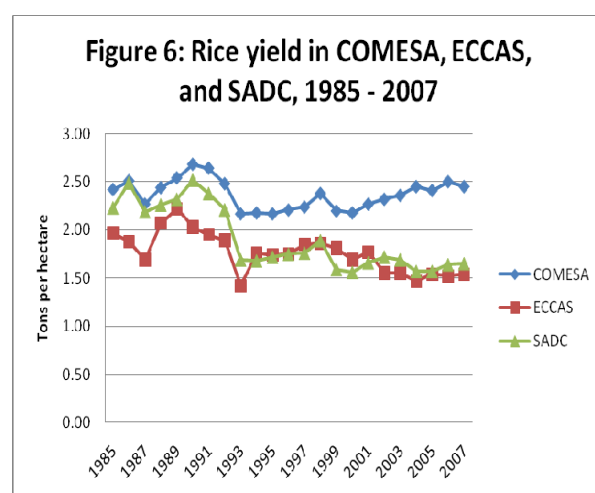
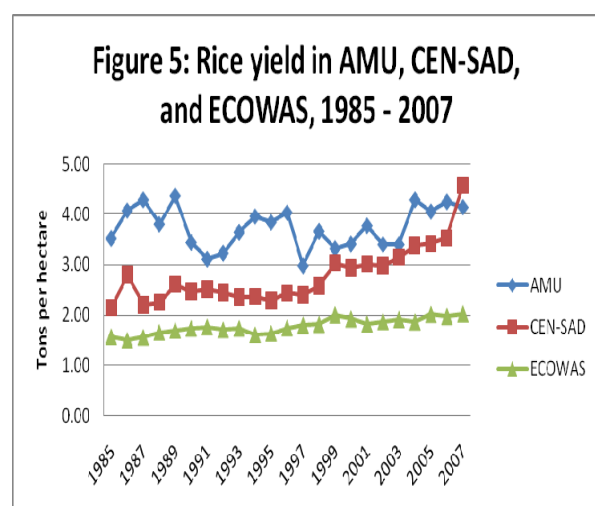


Africa is the only region in the world with the lowest yields in rice. Estimated yields for 2006 are 2.32 tons per hectare compared to 5.80 tons in Europe, 4.93 in the Americas and 4.22 in Asia. Average rice yields in Africa account for only 57% of the yields obtained in Asia. Yields have increased over the past two decades however, but the increase has been too small to make any significant difference. Most of the increase in production has come from expansion in the area harvested rather than from increases in yields. The regions with yields comparable to world yields are AMU (4.26 tons/ha) and CEN-SAD (3.52 tons/ha). Growth in yields has also been high in these two regions, averaging 2.0% and 4.0%

respectively during the period 1986 – 2006 (Table 3 and Fig. 5). In the COMESA, ECCAS and SADC regions, growth in yields have either stagnated or declined significantly (Fig. 6).

Table 3. Rice yields in Africa between 1986 and 2006, categorized by Regional Economic Community.

Region	Yield (kg/ha)		Average annual % growth rate (1986 – 2006)
	1986	2006	
Africa	1.95	2.32	1.25
AMU	4.08	4.26	2.00
CEN-SAD	2.18	3.52	4.00
COMESA	2.51	2.50	0.00
ECCAS	1.88	1.52	-1.00
ECOWAS	1.58	1.98	1.00
SADC	2.49	1.64	-1.00



Magnitude of effects in rice production

The de-composition analysis reveals that total rice production in Africa increased by 11.8 million tons between 1986 and 2006 (Table 4). The acreage, productivity and interaction effects were all positive. The increase in production attributed to the area harvested (acreage effect) was 8.1 million tons compared to 2.1 million tons due to the increase in yields (productivity effect). The estimated increase in production due to simultaneous (interaction effect) changes in area harvested and yield was 1.7 million tons.

Fifty one percent (6.1 million tons) of the increase in production occurred during 1996 – 2006 and the remaining 49% occurred during 1986 – 1996. All three effects were positive for both periods. In relative terms, the increase in area harvested accounted for 68% of the total increase in rice production during period 1986 – 2006 (Table 4). The productivity and interaction effects accounted for 18% and 14% respectively. The expansion in total area cultivated explains much of the increase in rice production on the continent. Overall, land area cultivated to rice grew by 3% per annum during 1986 – 2006, with the fastest growth of 3.8% occurring during 1986 – 1996. Overall growth in yields was 1.20 during 1986 – 2006 and 1.36% during 1996 - 2006. This is consistent with historical patterns since 1960, which indicate that the rate of growth of harvested area has been faster than the rate of yield increase; the increase in total output being driven mainly by extensification. According to the Africa Rice Center, the limited growth of the aggregate productivity of rice in Africa is due to the large share of rainfed rice and subsistence-based rice farming systems (Africa Rice Center, 2007).

The positive effects of changes in area harvested and yield on rice production in Africa conceals significant regional problems associated with rice production. In the COMESA, ECCAS and SADC regions for example, the productivity effects were negative, implying that rice yields declined overall during the

period 1986 – 2006. Declining yields reduced the overall gains in rice production in the SADC region by about 1.21 million tons (Table 4).

In the COMESA and ECCAS regions, falling yields reduced the gains in rice production by 0.56 million and 0.09 million tons respectively. This magnitude of yield effects is consistent with historical trends which indicate that yields stagnated in the COMESA region at about 2.5 kg/ha between 1986 and 2006, and declined by 1.0% per annum in the ECCAS and SADC regions each (Table 3). In the CEN-SAD and ECOWAS regions where the productivity effects are positive, increasing yields contributed 0.26 million and 0.25 million tons to total regional production, respectively.

Table 4. Sources of changes in rice production in Africa between 1986 and 2006, categorized by Regional Economic Community.

Region	Effect (1,000 tons)			
	Acreage	Productivity	Interaction	Total
Africa	8,061	2,082	1,678	11,821
AMU	47	-2	-9	36
CEN-SAD	2,856	256	647	3,758
COMESA	1,193	-560	2,028	2,662
ECCAS	364	-94	-165	105
ECOWAS	1,885	248	-347	1,785
SADC	682	-1,209	991	464
Percent of total change				
Africa	68.0	18.0	14.0	100.0
AMU	129.0	-5.0	-24.0	100.0
CEN-SAD	76.0	7.0	17.0	100.0
COMESA	45.0	-21.0	76.0	100.0
ECCAS	346.0	-89.0	-157.0	100.0
ECOWAS	106.0	14.0	-19.0	100.0
SADC	147.0	-261.0	214.0	100.0

Implications for rice policy development

The negative productivity effects observed in the COMESA, ECCAS and SADC regions have implications for national and regional rice policy development in Africa. Rice yields have stagnated or declined for a number of reasons that have been strategically and clearly articulated in IRRI's document on *“Responding to the Rice Crisis: How IRRI can work with its partners”* (IRRI, 2008).

It is clear from the de-composition analysis that RECs need to support their Member States to increase increase productivity rather than acreage cultivated if they are to quickly meet the short-fall in rice production. Among the challenges that national and regional policies should address is access to and use of improved technologies. If the negative productivity effects are to be reversed, new rice producing technologies must be developed and dissemination of existing technologies must be quickly up-scaled and out-scaled. RECs must push their Member States to increase investments in rice research and extension as a matter of priority. Such research must focus on developing improved, stress-resistant varieties; developing new methods and techniques for preventing post-harvest losses; and detailed characterization of rice genetic resources. Extension efforts must focus on dissemination of improved germ-plasm, hybrids and stress-resistant varieties. In non-rain fed areas, priority must also be given to increased investments in irrigation schemes including the relevant infrastructure.

National and regional policies should not focus only on increasing yields, but also on improving the scope of knowledge-based innovation along the entire rice value chain, from production to consumption. Providing rice farmers with better and more equitable access to sub-regional markets in Africa through the provision of information on market prices and opportunities is critical for successful rice development in Africa.

To rapidly increase rice production in Africa, action needs to go beyond the national level. Continental self-sufficiency in rice production will require a regionally coordinated rice policy in Africa. Regional policies must capitalize on the leverage effects of national policies and institutions by embracing region-wide initiatives that bring together national and regional research agencies and development partners to promote and build on recent achievements in rice technologies such as NERICA. Appropriate, results-oriented and partnership-based initiatives that are in line with the CAADP agenda

should be encouraged at both REC and continental (AUC/NEPAD/FARA) levels. National rice development strategies need to be up-scaled to regional rice development strategies (e.g. through regional CAADP Compacts) in order to benefit from the synergies and spill-over effects that spin out of national initiatives.

Regional Economic Communities need to work with national and regional research and policy institutions (NARS, SROs, FARA) to mobilize resources from various sources to meet both national and regional policy, institutional and investment priorities. Considering that CAADP and the Poverty Reduction and National Development Strategies (PRS/NDS) are the main frameworks for meeting the MDGs, both national and regional rice development strategies must effectively be linked with and aligned to CAADP and the PRS/NDS in order to benefit from sector-specific priority-setting and financing processes.

Strengthening partnerships at national, regional and global levels is critical for a successful regional rice policy implementation in Africa. Within the framework of the integrated agricultural research for development (IAR4D), collaborative initiatives, coalitions, and platforms that engage actors from across public, private and civil society stakeholders are needed to mobilize the necessary technical, human and financial resources for up-scaling and out-scaling national rice development initiatives. Good examples include the Coalition for African Rice Development (CARD) initiative, launched under TICAD IV in 2009, and spearheaded by JICA, NEPAD and AGRA. As a partnership-based initiative⁸, it aims at doubling rice production in sub-Saharan Africa from 14 to 28 million tons in 10 years by bringing together research agencies and regional/international financial institutions (Africa

⁸ This is in line with the Paris Declaration (PD) on Aid Effectiveness signed in March 2005 by 91 countries, 25 other organizations and 14 civil society organizations, and the Accra Agenda for Action (AAA) signed in September 2008 to accelerate and deepen implementation of the PD.

Rice Center, FARA, WFP, FAO, World Bank) to build on recent achievements including NERICA.

Conclusions

Rice is a strategic commodity for food security and poverty reduction in Africa. Domestic consumption of rice in Africa is significantly greater than domestic production, necessitating increased imports that drain large amounts of scarce foreign exchange. To reduce hunger and poverty in accordance with MDG 1, African Heads of State and Governments have requested the AUC, NEPAD and RECs to facilitate the attainment of continental self-sufficiency in rice by 2015. This has serious policy implications for the regional and continental organizations that are involved in rice development in Africa.

This policy brief examines patterns of change in rice production attributable to changes in area harvested and yields at continental and regional economic community level. Two primary effects – acreage and productivity and one interaction effect are estimated. The analysis shows that total production of rice in Africa increased by about 12 million tons between 1986 and 2006. The acreage, productivity and interaction effects were all positive. However, the acreage effect was greater (68%) than the productivity (18%) and interaction (14%) effects. In the COMESA, ECCAS and SADC regions, the productivity effects were all negative, implying that falling yields reduced overall production in rice.

Considering that most of the increase in rice production came from extensification rather than from intensification, rice policy development in Africa needs to focus on development and dissemination of productivity-enhancing technologies. New and existing technologies must be quickly up-scaled and out-scaled. National and regional agricultural policies should give priority to increased investments in rice research and extension and regional rice development initiatives must be aligned to national initiatives.

Within the context of the IAR4D, partnerships need to be strengthened at national, regional and global levels in order to mobilize the required technical, human and financial resources from public, private and civil society organizations. Efforts should focus also on improving the scope of knowledge-based innovation along the entire rice value chain, and providing rice farmers with better and more equitable access to sub-regional markets through information on market prices and opportunities.

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