Assessment of pull mechanism at enhancing maize farmers' utilisation of Aflasafe bio-control measures in Oyo State, Nigeria

By

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Introduction

- There has been increased in the number of people suffering from chronic hunger and undernourishment in the world from 804 million in 2016 to 821 million in 2017 [FAO *et al.*, (2018)] .
- Despite having a good number of improved technologies to tackle hunger and malnutrition, the modes of disseminating these innovations have prevented them from achieving their intended objectives.
- For scaling, there is now a paradigm shift in the approach to research and development from linear or push based to innovation system.
- In innovation systems thinking, the generation and exchange of (technical) knowledge are not the only prerequisites for innovation. Rather, other factors, such as organisational capacity, policy, infrastructure, funding, and markets, need to be stimulated and linkages among heterogeneous actors facilitated to enable innovation (Kilelu *et al.*, 2011).

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- The innovation in pull mechanism according to IITA and AgResults (2018) was to eliminate the constraints in demand and supply of agricultural technologies.
- Maize is the most widely-grown staple food crop in sub-Saharan Africa (SSA) occupying more than 33 million hectares each year (Macauley and Ramadjita, 2015).
- Aflatoxin contamination is a global problem affecting 4.5 billon people in developing countries. In Nigeria where smallholder farmers produce over 70 percent of the nation's maize crops, about 60% of maize production may be aflatoxin contaminated (IITA and AgResults, 2018).

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- In this study, aflatoxin contamination in maize is the developmental problem that needs solutions to ensure food safety and sustainable livelihood to the maize farmers.
- The incentives structure is the targeted outcome and parameters in the pull mechanisms that will motivate the solvers to invest in the design, development and drive the adoption of the technological solution.

Methodology

- Multi-stage sampling procedure was used in the selection of the respondents. Based on expert recommendation, 2 Local Government Areas (LGAs) in Oyo state were puporsively sampled. Then 5 communities were randomly sampled from each of the LGAs.
- Then using systematic random sampling, 10 farmers were selected from each of the communities to give a sample size of one hundred.
- Utilisation of Aflasafe bio-control was measured based on recommended rate of 10kg/ha [Partnership for Aflatoxin Control in Africa (PACA), 2016]. The level of utilisation was then computed as the ratio of quantity of Aflasafe (kg) and farm size (ha). Using a scale of 0-1, the farmers were then categorised into: **poor utilisation (**0.0 – 0.3) , **moderate utilisation** (0.4 - 0.9) **full utilisation** (1.0)

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Model specification

The regression analysis is explicitly represented below:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + \ldots\ldots\ldots + b_8X_8$$

Where,

Y = Aflasafe utilisation (0-1)

X_1 = Farmers' age (years)

X_2 = Household size (number of persons)

X_3 = Years in formal education (years)

X_4 = Farm size (hectares)

X_5 = Farming experience (years)

X_6 = Output of maize (kilograms)

X_7 = Price of Aflasafe (naira)

X_8 = Years of using flasafe bio-control

Results and Discussion

Farmers' awareness of Aflasafe bio-control

- The grand mean indicates that the farmers had high awareness of pre-harvest activities (X = 9.29) than post-harvest activities (X = 8.93). It is therefore expected that the high awareness of Aflasafe bio-control practices will translate into high utilisation by the farmers. This agrees with the findings of Olumba and Rahji (2014) that found significant relationship between farmers' awareness of improved plantain technologies and its adoption.

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Farmers' sources of purchase of Aflasafe bio-control

Table showing distribution of farmers' sources of purchase of Aflasafe		
	Frequency	Percent
Implementers	81	89.0
Agro-dealers	3	3.3
IITA	4	4.4
Other farmers	3	3.3

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Incentives to utilisation of Aflasafe bio-control in maize production

- Majority (97.8%) of the respondents indicated premium payment for Aflatoxin-free maize as an incentive to utilisation. Also, 94.5% indicated provision of technical assistance and improved health from consuming Aflatoxin maize.
- This supports the finding of BenYishav and Mobarak (2018) that posits that incentivizing disseminating farmers through ***material rewards*** aided diffusion of pit and composting technologies among farmers in Malawi.

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Level of Utilisation of Aflasafe

Table showing distribution of farmers according to level of utilisation of Aflasafe bio-control.

Level of Utilisation	Frequency	Percent	Mean
Poor utilisation (0.1-0.3)	31	34.0	
Moderate utilisation (0.4-0.9)	11	12.0	0.7
Full utilisation (1.0)	49	54.0	

Constraints to the Utilisation of Aflasafe

- Low access to credit facilities (X=2.5), inadequate sources of purchase (X=2.4) and lack of storage facilities (X=2.3) were identified constraints to utilisation of Aflasafe bio-control measures.

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Factors influencing farmers' utilisation of Aflasafe bio-control measures

Table showing result of linear regression model for factors influencing farmers utilisation of bio-control measures

Variables	Unstandardized coefficient		Standardized coefficient	T	Sig.
n = 91	B	Std. Error	Beta		
Constant	241.312	58.110		4.153	0.000
Farmers' age	-0.011	0.003	-0.384	-3.121	0.002*
Household size	0.036	0.012	0.391	3.010	0.003*
Education	0.029	0.007	0.404	3.994	0.001*
Farm size	-0.050	0.016	-0.723	-3.115	0.003*
Experience in maize production	0.016	0.005	0.572	3.330	0.001*
Output	0.001	0.000	0.531	2.254	0.027*
Cost of Aflasafe	2.972	0.001	0.077	0.790	0.432
Years of using Aflasafe	-0.120	0.029	-0.408	-4.141	0.001*

$R = 0.736$ $R^2 = 0.541$ Adjusted $R^2 = 0.497$ *Significant at $p \leq 0.05$

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Hypothesis testing

Ho1: There is no significant relationship between incentives and utilisation of Aflasafe bio-control

Table showing significant relationship between incentives and farmers' utilisation of Aflasafe bio-control

	Mean	r-value	p-value	Decision
Incentives	8.15	0.274	0.001	Significant
Utilisation	0.71			

*Significant at p≤0.01

Conclusion and Recommendations

- The incentives measures at both demand and supply sides of pull mechanism have proven innovative toward scaling the uptake of agricultural technology
- Governments and nongovernmental organisations should make loans available for purchase of Aflasafe or subsidised its cost to make it affordable for the farmers.
- Also, ministries and agencies of governments should create more awareness of the incentives to Aflasafe utilisation through radio and television.
- Efforts should also be geared in selecting experienced maize farmers and those with high level of formal education in the upscale of the technology.

Thank you for your kind attention