

Proceedings of the Annual Conference of the Agricultural Extension Society of Nigeria

Number: Twenty-Sixth Annual Conference

Theme: Redefining Agricultural Extension Practice to Cope with Emergencies

Date: 26-29, April 2021

Venue: Federal University of Agriculture, Abeokuta, Nigeria

ISSN: 1595 – 1421. <http://aesonnigeria.org/ConfProc> . **Email:** editorinchief@aesonnigeria.org

Willingness To Use Ice-Fish Box by Fresh Fish Value-Chain Actors in Lagos State, Nigeria

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<https://dx.doi.org/10.4314/jae.v26i1.10S>

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Abstract

A fish preservation technology was developed in the year 2016 by Nigerian Stored Products Research Institute, (NSPRI) in a well-insulated container known as “NSPRI Ice-Fish Box” (NSPRI-IFB). The technology was disseminated to fresh fish value-chain actors (farmers, marketers, processors and transporters) in selected coastal local government areas of Lagos State namely Lagos Mainland, Epe, Badagry and Ikorodu which housed Asejere, Epe, Badagry and Ijede fish markets respectively in 2019. The study was conducted in these markets to ascertain the awareness status and determine the willingness of these actors to use NSPRI-IFB. Data were randomly collected from 110 respondents selected through a simple random sampling procedure using questionnaire and analysed using descriptive statistics and Chi-square statistical tool. Excellent numbers of actors (81.82%) are well aware of NSPRI-IFB while 27.27% of them declare they are not aware. Results further shows that actors are very willing to use NSPRI-IFB for fresh fish preservation ($\bar{x} = 3.87$) and transportation ($\bar{x} = 3.81$). However, they are not at all willing to use the technology for fish processing ($\bar{x} = 1.67$) and curing ($\bar{x} = 1.73$). Chi-square analysis reveals significant associations ($p \leq 0.05$) between willingness to use NSPRI-IFB and actors' age and level of education. Conclusively, value-chain actors are well aware and are willing to use the technology. Fresh fish postharvest loss reduction policy should be directed towards mass adoption of NSPRI-IFB.

Key words: Willingness, awareness, NSPRI-IFB, fresh fish, value-chain actors.

Introduction

Fish contributes largely to the protein intake of man in Nigeria and it is very nutritious and good for human consumption, it also serves as a means of earning income for those who rear it. According to the Food and Agricultural Organisation (FAO, 2020), fish farming is dominated by Asia, which has produced 89 percent of the global total in volume terms in the last 20 years. Over the same period, the shares of Africa and the Americas have increased, while those of Europe and Oceania have decreased slightly.

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In Africa, five percent (5%) of the population, about 35 million people, depend wholly or partly on the fisheries sector, mostly artisanal fisheries, for their livelihood (FAO, 2020). It has been estimated that 10 percent by weight of world fish catch is lost to poor handling, processing, storage and distribution. However, losses in small-scale fish processing are said to be particularly high and figures as high as 40 percent are sometimes reported (Benson *et al.*, 2017). In tropical countries such as Nigeria, fish spoil quite rapidly within a few hours of landing, if not properly cooled with its attendant economic loss to anglers, processors and fish traders. There are other noticeable problems associated with fishing; among them is the disturbing problem of poor handling of fish during the various stages of postharvest chain which reduces the market value of about 40 percent of the total fish caught in Nigeria annually (Adelaja *et al.*, 2018).

Fish need to be kept fresh between when they are harvested and when they are transported to the markets or processing centres which led to the development of a low cost technology, named Ice Fish Box, by the Nigerian Stored Products Research Institute (NSPRI). It is a simply box which consists of a smaller plastic container fitted inside a bigger one with space in between completely filled with an insulating material, a lid and a drain pipe through which waste water in the box flows out. The holding volume of the fish box is $27.04 \times 10^{-3} \text{ m}^3$ and has the capacity of holding a total weight of 18 kg (fish and ice) (Atanda, *et al.*, (2016). The Ice Fish Box is thus properly designed for the job of landing good quality fish.

Pessu *et al.*, (2016) carried out a comparative quality assessment on tilapia (*oreochromis niloticus*) and catfish (*clarias gariepinus*) stored in NSPRI-IFB; the study established that quality index and sensory evaluation in both fish species were still acceptable within 72hrs of storage. Similarly, biochemical and lipid oxidation changes in *Clarias gariepinus* (Burchell 1822) stored in NSPRI-IFB were found to be very stable for 30 hours at a temperature of 8.1°C and relative humidity of 96.4% in fish to ice ratio 1:1 (Atanda, *et al.*, 2016). On the premise of these studies, awareness creation and popularization of the technology was carried which involved dissemination (distribution of the NSPRI-IFB) to fresh fish value-chain actors in Lagos State. Therefore, the need to assess the willingness of these actors to use NSPRI-IFB for fresh fish preservation becomes very germane and formed the broad objective of this study. Specifically, the study sought to ascertain awareness status of the respondents on NSPRI-IFB, and also, to evaluate value-chain actors' willingness to use NSPRI-IFB.

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Fig 1: NSPRI-IFB (Source: NSPRI)

Hypotheses of the study

H_{01} : There is no significant association between the selected socio-economic characteristics of stakeholders and their willingness to use NSPRI-IFB

Methodology

The study was conducted in Lagos State from February to July 2019. Lagos State is the smallest state in Nigeria situated in the Southwestern geo-political zone of the country with population well over 14 million Nigerians (UNWUP, 2019) spread across the entire 20 Local Government Areas. The state is primarily Yoruba speaking which shares boundaries with Ogun State, both in the North and East and is bounded in the West by the Republic of Benin. Its Southern border stretches for about 180 km along the coast of the Atlantic Ocean. It is home to all other ethnic groups within the country and foreign neighboring countries. Lagos State occupies an area of 3,577 km² landmass with about 22% (786.94 km²) representing the Lagos lagoons (fig 1.). According to Benson *et al*, (2018), the state is very rich in different forms of aquatic ecological zones that support different varieties of fish species and aquatic organisms; thereby providing productive fishing opportunities for fishers.

A combination of purposive and simple random sampling techniques was used to select samples amongst fresh fish value-chain actors who are beneficiaries of NSPRI-IFB when it was distributed. Four (4) local government areas of Lagos State namely Lagos Mainland, Epe, Badagry and Ikorodu which housed Asejere, Epe, Badagry and Ijede fish markets respectively were purposively selected. This was followed by random selection of thirty (30) respondents from these actors (farmers, marketers, processors and transporters) in the fish markets; this gave a total sample size of 120 respondents. A total of 120 copies of a structured questionnaire with combination of open and closed ended questions in line with the objectives of the study were distributed but 110 were

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retrieved (91.7% retrieval rate) and used. The research instrument was designed to capture the socio-economic characteristics of the respondents, fresh fish value-chain actors' awareness of NSPRI-IFB which was measured using two dichotomous variables Yes (1) and No (0). Using perception statements, stakeholders' willingness to use NSPRI-IFB was evaluated on 4-1 rating scale as very willing, somewhat willing, a little willing and not at all willing, in that order. The weighted score and mean of the perception statements were calculated and ranked. Descriptive statistical analyses such as frequency counts and percentage distribution were carried out. Inferential statistical analysis such as Chi-square was used to test the associations between variables using SPSS 20.0.

Results and Discussion

Awareness of Ice-Fish Box

Table 2 shows that the majority of the respondents (87%) were aware of NSPRI-IFB, an indication that the technology is well known amongst the stakeholders for preservation of fresh fish. This agrees with Ifeanyieze (2017) who asserts that combining research and extension functions into one unit is a vital mechanism in technology transfer linkages for sustainable agricultural development. About 13% of the stakeholders declared they were not aware of NSPRI-IFB were possibly new entrants.

Table 2: Distribution of respondents based on awareness of Ice-fish box

| Awareness status | Frequency | Percentage |
|------------------|-----------|------------|
| Yes | 96 | 87.3 |

Source: Field data 2019

Willingness to use Ice-Fish Box

Table 3 shows that value-chain actors were very willing to use NSPRI-IFB for fresh fish preservation ($\bar{x} = 3.87$) and transportation ($\bar{x} = 3.81$), these variables ranked 1st and 2nd respectively. This follows a priori expectation because the technology was developed primarily for these purposes (Pessu *et al.*, 2016; Atanda, *et al.*, 2016). Results further showed that sampled value-chain actors were also very willing to use the technology for storage ($\bar{x} = 3.51$) and marketing ($\bar{x} = 3.36$) purposes; these could be regarded as secondary purpose utilisation of NSPRI-IFB. Sixty percent (60%) and 58% of the value-chain actors do not regard NSPRI-IFB as fish processing ($\bar{x} = 1.67$) and curing ($\bar{x} = 1.73$) technology respectively and consequently, they were not at all willing to use for such purposes.

Table 3: Willing to use NSPRI-IFB

| Perception statements | Wtd Mean | Ranking |
|-----------------------|----------|---------|
|-----------------------|----------|---------|

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| | | |
|--------------------------------|------|-----------------|
| Fresh fish Transportation | 3.81 | 2 nd |
| Fresh fish curing | 1.73 | 7 th |
| Fresh fish Storage | 3.51 | 3 rd |
| Fresh fish filleting | 2.01 | 5 th |
| Fresh fish Preservation | 3.87 | 1 st |
| Fresh fish brining | 2.23 | 6 th |
| Fresh fish sales and marketing | 3.36 | 4 th |
| Fresh fish processing | 1.67 | 8 th |

Source: Field data 2019

Association between willingness to use NSPRI-IFB and value-chain actors' characteristics

Tables 4 shows that age ($\chi^2=33.21$; $df=15$) of the respondents had a positive significant ($p\leq 0.05$) association with the willingness to use NSPRI-IFB. In other words, the ages of these value-chain actors are key factors that could influence the willingness to utilize the technology. Mwangi and Kariuki (2015) establish that the active age group are characteristically less risk-averse and are willing to try new technologies than older farmers. Furthermore, younger farmers still have the potency to take a risk and search for new agricultural innovations.

Similarly, education attainment ($\chi^2 = 49.58$; $df=15$) of the actors also had a positive significant ($p\leq 0.05$) association with the willingness to use NSPRI-IFB. It is expected that more knowledgeable fresh fish value-chain actors will adopt more improved technologies than those less knowledgeable. Previous studies (Sennuga *et al.*, 2020; Iftikhar, 2019) have established positive relationships between respondents' willingness to use improve technology and their characteristics.

As reported in Table 4, value-chain actors' years of experience and the willingness to use NSPRI-IFB were not significantly associated ($p\geq 0.05$), the reason may not be far-fetched, the technology was disseminated for usage and adoption in less than two years. This finding is at variance with Petros, (2010) and Melaku, (2005) whose studies has established, in separately reports, significant positive relationships between these variables.

Table 4: Association between willingness to use NSPRI-IFB and selected characteristics of value-chain actors

| Variables | χ^2 -value | Df | Contingency Coefficient |
|----------------------|-----------------|----|-------------------------|
| Age | 33.21 | 15 | 0.384* |
| Education attainment | 49.58 | 15 | 0.453* |

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Years of experience 18.00 21 0.674

***P ≤ 0.05. Source: Field data 2019.**

Conclusion and Recommendation

Fresh fish value-chain actors had high level of awareness about NSPRI-IFB; they are very willing to use the technology for preservation and transportation of fresh fish but are not at all willing to use the technology for curing and processing. In addition, socioeconomic characteristics such as age and level of education could significantly influence fresh fish value-chain actors' willingness to use NSPRI-IFB. In other to minimize postharvest loss in fresh fish, policy should be directed towards mass adoption of NSPRI-IFB.

Acknowledgement

The management of Nigerian Stored Products Research Institute is here appreciated for disseminating NSPRI-IFB to fresh fish value-chain actors without which this study would not have been possible. Thank you.

References

- Adelaja, O. A., Kamaruddin, R. B., and Chiat, L. W. (2018): Assessment of post-harvest fish losses Croaker *Pseudolithus elongatus*, (Bowdich, 1825), Catfish *Arius heudeloti*, (Valenciennes, 1840) and Shrimp *Nematopalaemon hastatus* (Aurivillius, 1898) in Ondo State, Nigeria, *Aquaculture and Fisheries*, Volume 3, Issue 5, Pages 209-216.
- Atanda, S.A., Pessu, P.O., Agboola, A.A., Benson, O.B., Nwanade, C.F. and Adeniyi, B.M. (2016): Biochemical and Lipid Oxidation Changes in *Clarias gariepinus* (Burchell 1822) Stored in Fish Ice Box. *Open Access Journal of Agricultural Research*, 1(3): 000112.
- Benson, O. B., Agoda, S., Atanda, S. A., Ajayi, A. O., and Adetunji, V. (2017): Gender Participation in Fish Harvesting Activities in Catch-Locations in Lagos State Nigeria: A Tool for Food Security and Sustainability. *Journal of Biology, Agriculture and Healthcare* Vol.7, No.16. page 10-17.
- Benson, O., Ambee, I., Akinnibagbe, O., Omotuyi, B. and Solagbade, A. (2018): Gender roles in fisheries post-harvesting activities in catch-locations within coastal areas of Lagos State Nigeria. *Journal of Agricultural Extension and Rural Development* Vol.10 (12), pp. 245-250, DOI: 10.5897/JAERD2018.0980
- Food and Agricultural Organisation (2020): The State of World Fisheries and Aquaculture. Sustainability in action. Rome. <https://doi.org/10.4060/ca9229en>.
- Ifeanyieze, F. O., Nwarieji, F. E., and Aneke, C. U. (2017): Linkages of research agencies in technology transfer for sustainable agricultural development in south-east, Nigeria. *African Journal of Agricultural Research* Vol. 12(24), pp. 2063-2069, <https://doi.org/10.5897/ajar2016.11816>.
- Iftikhar, S., Saqib, A., Sarwar, M.R., Sarfraz, M., Arafat, M., and Shoaib, Q-u-a. (2019): Capacity and willingness to use information technology for managing chronic diseases among

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patients: A cross-sectional study in Lahore, Pakistan. *PLoS ONE* 14(1): e0209654. <https://doi.org/10.1371/journal.pone.0209654>

Melaku G. (2005): Adoption and Profitability of Kenyan top bar hive beekeeping technology: A study in Ambasel woreda of Ethiopia. Unpublished MSc thesis, Alemaya University, Alemaya, Ethiopia.

Mwangi, M., and Kariuki, S. (2015): Factors Determining Adoption of New Agricultural Technology by Smallholder Farmers in Developing Countries. *Journal of Economics and Sustainable Development*, 5: 6, 208-216.

Pessu, O.P., Agoda, S., Benson, O.B., Fapounda, T. B., Ijaware, A.O., and Udefi, I.O. (2016): Comparative assessment of quality of tilapia (*oreochromis niloticus*) and catfish (*clarias gariepinus*) stored in ice fish box. *Scientia Africana*, Vol. 15 (No 2), Pp 9-17.

Petros T. (2010): Adoption of Conservation Tillage Technologies in Metema Woreda, North Gondar Zone, Ethiopia. An M.Sc thesis Submitted to School of Graduate Studies of Haramaya University.

Sennuga, S.O., Fadiji, T.O., and Thaddeus, H. (2020): Factors Influencing Adoption of Improved Agricultural Technologies (IATs) among Smallholder Farmers in Kaduna State, Nigeria. *International Journal of Agricultural Education and Extension*, 6(2): 382-391.

United Nations World Urbanization Prospects (2019): World Population Review, Lagos State Population 2021. Accessed: September 4, 2021. <https://population.un.org/wpp/Download/Standard/Population/>