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An appraisal of techno-dynamics structure for on-farm textile innovations development in Ondo state, Nigeria

Ajila KO

Department of Family, Nutrition and Consumer Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria

Abstract

The study aimed at appraising techno-dynamics structure for on-farm textile innovations development in Ondo State of Nigeria. It assessed cultural-systematic factor and, analysed socio- economic characteristics of techno- dynamics structure influencing development of the innovation. Public Agricultural Development Programme's agency in the State was selected, and snowball sampling procedure was used in selecting four Agricultural Research Institutes for the study. Purposive sampling procedure was employed in selecting a total of 78 research and 90 extension staff. Key informant interviews schedule, questionnaire, and Focus Group Discussions were used to generate information. Descriptive statistics was applied in summarizing data collected and correlation analysis for determining relationship between development and techno-dynamics structure. Finding from social survey highlighted low level of development for introduced innovation. Technical knowledge given to farmers was not adequate enough to support development and, the innovations suffered customary lag. On-farm textile development lacked appropriate innovation emergence and dissemination approach, in which none of the officially assigned institutes were involved. At $p \leq 0.01$ and $p \leq 0.05$ the following techno-dynamics variables showed significant relationship with development *viz*: accessible innovation transfer system ($r = -0.597^{**}$), staff training needs ($r = 0.391^{*}$), marketing mechanism ($r = 0.475^{*}$), and funding system ($r = 0.371^{*}$). It is therefore suggested that, government should consent to statutory policies and principles of innovation emergence and transfer. Policy makers and administrators should monitor and strengthen interaction between all related institutes of the innovation. Adequate funding should be provided for research and extension activities for on-farm textile development.

Keywords: on-farm, textile, innovation, techno-dynamics, development

1. Introduction

At pre-independent era textile was an imperative source of foreign revenue to Nigeria. The sector was tagged largest employer of labour after government (Dike, 2019) ^[1] and, a core area of research activities. For growth, textile was integrated into extension programme of rural and agricultural development. Foremost objectives of this scope of extension services were to; create productive and small-scale employment, increase domestic supply of fibres to feed local industries and keep pace with rising demand for its products, and expand textile exports, toward increase in national economic development (Akinbode and Agboola, 1986) ^[2]. To achieve these goals all along with agricultural productions, government strengthened textile extension services for fibres production and processing, to the extent of organizing standard marketing board for natural fibre production Nseobong (2017) ^[3]. (Alao 1984) ^[4] noted that, research and extension recorded success on rural and agricultural development till early 80's in Nigeria.

The discovering of petroleum oil and commencement of its processing in mid 70's diverted government and its citizenry interest from farming, mostly on-farm textile activities like fibres and dyes productions. The modified Training & Visits (T&V) Agricultural Development Extension Programme of 1972 focused on food increase and, was co- sponsored by

Nigeria government and the World Bank Dare *et al.* (2017) ^[5], further abets the diversion. Nigerian been an agrarian society with farming as her mainstay was ushered into mass unemployment because of the above occurrences. In 1983 cotton marketing board along with others farm marketing systems were proscribed by the government and every other affiliated organisations, mostly research and extension activities became partially moribund. By mid 80's, economic austerity set-in and the conception of Structural Adjustment Programme (SAP) at this period further fuelled the stringent economic crisis.

By and large extension services recorded failure rather than success, and such failure was principally entrenched in the system formal institutions that formed technologies techno-dynamics structure. On the part of the policy-makers and administrators, importance of food technologies were exaggerated while other areas of extension are relegated to background Sarah, Kritin and Karin (2017) ^[6], and the key role of labour management in the whole process of economic development was taken for granted. Such an attitude results in unrealistic programming and under effective action. Jibowo (1998) specified the tasks of improving rural community through extension services as been ill - defined in direction, and content are over whelming for the agent, who then falls back on

administrative duties as an excuse for not visiting the field. Government officials responsible for agricultural improvement are led to believe that no significant progress action can be made unless new capitals are made available, mainly from foreign sources and new inputs reclaimed through expensive projects (Alao, Agboola. and Olaniyan, 1996) [8]. For the modified extension services simple and effective action were delayed while foreign aid in form of complicated machinery's or sophisticated techniques often do not yield the expected benefits, because they are expensive and seldom appropriate for Nigeria culture (Ajila, 2011) [9]. This fact was confirmed with abandoned equipments littering extension services stations in Nigeria. It was the partial and neglect at the planning stage of most projects that had led to series of emergencies and failure in extension services, and these emergencies usually transmits to shortages. Such failure came either from bad central planning or an over ambitious programmers which allows effort on a country-wide scale with resources equal only to one thirds of the country or engages simultaneously half a dozen schemes Idachaba(1997) [10], all of which will compete for the same administrative resources. Sani, *et al.* (2015) [11] noted that, information gathering has been inefficient, criteria of cost - effectiveness are not applied, poorer people are often neglected and information were acquired, owned and analysed mainly or only by outsider.

Level of unemployment and poverty in Nigeria became unmanageably lofty in which some citizen started picking from dust-bin in late 80's. In an effort to combat these serious problems, government geared toward initiating streams of rural economic empowerment and development policies as an approach for creating job. Since then, every government succession has sustained this approach. Example of these Programme are United Nations Development Programme (UNDP), International Fund for Agricultural Development (IFAD), Agricultural Development Programmes (ADPs), Food and Agricultural Organisation (FAO), National Economic Empowerment and Development (NEED), Directorate of Food, Roads and Rural Infrastructure (DIFRRI), National Orientation Agency (NOA), National Accelerated Food Production Programme (NAFPP), Green Revolution (GR), Operation Feed the Nation (OFN) and, others. These efforts had yielded little or no impact on rural population, and the gradient line for poverty unremittingly increases (Handley *et al.*, 2009 and Gate, 2014) [12, 13]. The manifestation of the global economic crisis further deepened poverty in Nigeria.

Part of government efforts in responds to the International Monetary Fund recommendations on global financial crisis was revisiting and strengthened of textile innovations entrepreneurship development with the approval of special fund called Textile Upgrading Fund (TUF) in 2010. Before this period, Textile Development Fund policy was established in 1997. Again, on-farm and non-farm textile innovations including off-farm textile activities received government supports through making provisions for diverse incentives such as inputs distribution, accessible loans and trainings, refurbished and empowered ginneries among others. Importations of textile goods were banned and supported with vigorous training and campaign on all mass media toward adoption of local textile goods. Again in 2015, government launched the National, Cotton, Textile

and Garment Enterprise policy and backed it up with released of fund, mostly for fibre production. Recent effort is the establishment of Textile Revival Implementation Committee (TRIC) to drive the initiative for achieving self-sufficient in cotton production and textile materials. Dike (2019) [1] identified that, the federal government mandated the Central Bank of Nigeria to make special funds available for the production of textiles and garments locally, again N19.18 billion was approved to finance nine ginneries. In 2020, central Bank of Nigeria also approved N50 billion tagged Revival Fund for Textile Industry among other special funds (The Nation, 2020). For effectiveness, every formal institutes relating to fibre production like agricultural research and extension were tasks and strengthened. Howbeit, each institute operates a unique structure for efficiency.

Structure indoctrination factors are very vital in any organisation on the perspective that, its controls sequences of practical steps for addressing issues. It's spelt out functions of each department or unit involved in the system or the authority vested on them. Vlad (2007) [16] noted that, when institutional support for any system is weakened, it habitually attributed to weak coordination so, it remains fundamental instruments for effective performances in every system. If unifying integration with full purpose of holistic development is inevitable for textile technologies, there must be linkage among all the institutes and this should be an integral part of the structure that need be coordinated effectively. Integration includes formal and informal finance, administrative and information links among institutes. Formal link includes such mechanisms as coordinated plans of action, collaborative groups' task, and regular exchange of information and materials (CTB, 2020 and Stephen, 1994) [18]. Informal links broadly includes personal contacts between colleagues and incidental exchanges of information. Cernea (1999) [19] said that although, cooperation across disciplinary fences is difficult, even across additional bureaucratic wall has become virtually impossible, but only the well orchestrated joint efforts of technical and social expert towards a project in the extension system can produce a harmonized effectiveness.

1.1. Objectives of the study

1.1.1. Main objective

Main objective of the study was to appraised techno-dynamics structure for on-farm textile innovations development in Ondo State of Nigeria.

1.1.2. The Specific objectives are to;

- assessed cultural- systematic factors of the techno-dynamics structure influencing on-farm textile innovation development in Ondo State of Nigeria, and
- analysed socio-economic characteristics of techno-dynamic structure influencing on-farm textile innovation development in Ondo State of Nigeria.

2. Methodology

2.1. Study area

The study was conducted in Ondo State of Nigeria. The State has nineteen Local Government Areas (LGAs), and was splinted into two zones for the purpose of extension service administrations. Each zone comprises of about nine

blocks, with eight circles within a block (A block is equivalent to Local Government Area/LGA) and, each circle consist of ten groups of villages. The essential component of agricultural extension training institute on innovation transfer in Nigeria was the Agricultural Development Programme (ADP's) agency that was situated under the Ministry of Agriculture in each State (Daneji, 2011) [20].

2.2. Sample selection and research instruments

Sample for the study was dichotomy in composition of staff from Agricultural Research and, Extension institutes in the study area. At the Block level, purposive sampling technique was used in selecting eighteen blocks as showed in Table 1. Eighteen Block Extension Supervisors (1 per block) and 18 Subject Matter Specialists (1 per block) were selected. Again, 36 Agricultural Extension Officers (2 per block) were selected for the study. List of administrative and technical officers at the State and Zonal levels of ADP's was used. The Programme Manager (1), Director of Extension (1), Zonal Managers (2), Zonal Extension Officer (4), and Subject Matter Specialists (8) were selected. Snowball sampling procedure was used in selecting four research institutes that were involved in on-farm textile innovation activities viz are; Institute of Agricultural Research and Training (IAR &T) Ibadan, Rubber Research Institute of Nigeria (RRIN) Benin, Forestry Research Institute of Nigeria (FRIN) Ibadan, National Agricultural

Research and Liaison Services (NAERLS), Ibadan. List of Research fellows in the selected Institutes were used. All Head of Programmes (HOPs) and, other Scientists, whose works are mostly related to on-farm textile technologies were selected. A total of 76 Researchers and 90 Extension staff were interviewed for the study. Again 18 groups of villages (one group of villages per block) were highlighted and 10 [1] residents were randomly selected from each group, making a total of 180 residents. Information was also gathered from 90 on-farm textile farmers (five farmers per block). Information was elicited from these groups of respondents for the measurement of development. Data was collected between November, 2019 and March, 2020.

Questionnaire was used in eliciting information from the respondents. Available professional bodies' records including system mappings were viewed for secondary data collection. Personal interaction and observation, key informant interview schedule and, nine Focus Group Discussions (FGDs) sessions were held in eliciting primary and direct information from the respondents. Three sessions of the FGDs were held at Fortnightly Meetings (FNTs), one at ADP's headquarter, two during MTRM's, two at the Research Institutes and, one at Conference of Textile and Research Association of Nigeria. Research instruments were exposed to test – retest method for reliability at interval of two weeks. A reliability coefficient of 0.71 was obtained. The data generated were subjected to frequency counts and correlation analysis.

Table 1: Table showing selected Zones and Blocks for the study.

| Zones | Blocks (LGA's) |
|-------|---|
| Owo | Ifelodun, Akure North, Akure South, Owo, Ose, Akoko South-East, Akoko South -West, Akoko North- East, Akoko North-West, |
| Ondo | Ikale, Ifedore, Idanre, Ile-Oluji/Oke-Igbo, Odigbo, Irele, Ilaje/Eseodo. Bolorunduro, Okitipupa. |

Source: ODSADEP, 2012 [21].

2.3 Measurement of variables

Operationalized variables for this study were dependent (development) and independent variables (techno-dynamics structure). The dependent variable (Y) was measured by adoption and serviceability of the introduced innovations. Respondents were subjected to opinion statement on five-point Likert scale; strongly Agreed (SA), Agreed (A), Undecided (U), Disagreed (D), and Strongly Disagreed (SD). The statements of opinion for this variable were tied around, adoption and serviceability indicators such as rate innovation introduction, training and knowledge adequacy, awareness, project relative advantage, benefit-returns, compatibility among others. The five points were quantified ranging from 5 to 1. Then in order to calculate the minimum T- score that represent "Agreement" for the each indicator, the mean of the T- score for Undecided and Agree (centralised point) was calculated, and any group whose T – score was significantly equal to or higher than the minimum T – score for Agreement was accepted, and T- score that is less than was rejected. The responses were categorised into three level of development, using the development mean score and standard deviation viz: High level of development = mean score + standard deviation. Low level of development = mean score – standard deviation. Average level of development = any score less than or equal to high level of development, but higher than or equal to low level

of development. The independent variables(X) were measured by cultural- systematic factors, and socio-economic characteristics of the techno-dynamic structure. For example variables reviewed under the cultural - systematic factors include visibility of research system, accessible technologies transfer system, customary interaction, innovation emergence approach, staff training needs and others. Also, credit and marketing system, including inputs supplies, functional infrastructure facilities, funding among others were used in measuring socio-economic characteristics of the techno-dynamics structure.

2.4. Data analysis

Descriptive statistical techniques such as frequency, percentages, mean and standard deviation were used to describe and summarized the collected data. Correlation analysis was applied in detecting the relationship between development and techno-dynamics structure of on- farm textile innovation.

3. Results and Discussions

3.1. Cultural-systematic factor of techno-dynamics structure: Procedures for superior technologies generation and transfer approach directed at solving problems encounter by farmers was examined under this factor:

3.1.1. Visibility of research institutes

Findings on visibility of research institutes for on-farm textile innovations in the studied area revealed that, there were no autonomous agricultural research institute located in the State. But there are agricultural research activities that were university based and directed as indicated by all (100%) the researchers. Research activities on agriculture often take place outside the State and coordinated by Agricultural Research Institutes of ^[2] Southwest region of Nigeria. In support of Oladimeji (2006) ^[22], this region housed several Agricultural Research Institutes such as; Institute of Agricultural Research and Training (IAR &T) Ibadan, Rubber Research Institute of Nigeria (RRIN) Benin, Forestry Research Institute of Nigeria (FRIN) Ibadan, National Agricultural Research and Liaison Services (NAERLS), Ibadan and others but, only few are involved in on-farm textile research activities. It was observed that RRIN had recently been moved to join Agricultural Research Institutes of South-South region of Nigeria, but South-West region still relates with RRIN on rubber innovation activities. The ^[3] Scientists (100%) highlighted on-farm textile innovation as a programme among other numerous agricultural research programmes seated in the selected institutes. Thorough examination shows that, there were justifiable but very few on-going researches work in on-farm textile innovation mainly on fibers and rubber production. Most Federal and State Universities in the region also had diminutive researches and extension works in on-farm-textile innovations. It shows that there were established and functional research institutes for on-farm textile innovations but located outside the area.

3.1.2. Research accessibility, and innovations emergence mode

Diagnostic survey and prescriptive procedural approach for on-farm textile innovations was viewed from the researchers' perspectives. There were experimental stations for on-farm textile activities in the State but barely functional (100%). This was attached to lack of funding, researchers' proximity, in-security and other logistic supports. In accordance with Alao (1997) ^[9] 82.0 percent attested that research results from most institutes were ingrained on journal publication for staff promotion assessments and, often not made available for public application or extension programme. Finding revealed personal interactions between research staff but no cordial alignments within and across related scientific disciplines (73.5%). Apart from the fact that, each staff seek and enjoyed personal recognition and rewards (100%), departmental security was given more premium (64%) hence, concealed research findings and knowledge from others and public.

Procedure for research running toward emergence of technologies was examined. Findings specified that, research staff were involved in problems identification, on-station research (OFR), and technologies evaluation for certain projects of the institutes but not in on-farm textile. While the introduced innovation emerged from problem identification and definition by bodies that were not part of Research Institutes of the region (97%), none of the respondents participated in the innovation generation and prioritizing for multi-locational trials or multiplications.

Most recent superior generic textile varieties were generated by agencies like Mahyco Nigeria Private Limited, Institute of Agricultural Research (IAR) in Ahmadu Bello University, Zaria and others. It was revealed that, the National Agricultural Extension and Research Liaison Services (NAERLS) in the region was occasionally involved in the innovation diffusion. This is an indication that, research running for emergence of on-farm textiles superior varieties were born outside the environment hence, the introduced innovations was not farmers or community based problems oriented. Research should come closer to farmer's field through extension organization for efficient Monitoring and Evaluation (M&E) FMARD (2019), and feedback from M&E will aid in developing solutions befitting local situations.

3.1.3. Training needs and customary interactions

Training needs for effective and efficient staff performances in agricultural research and extension institutes were reviewed. Through examination into the research institutes identified opportunities for trainings (on and off-the-job) within and outside the nation that were opened to all staff. All have enjoyed these opportunities but its actualization frequency was rated average (100%) which was due to tight administrative bureaucracies. Research staff normally accessed in-service trainings through local and international conferences, seminars, and workshops. Mean values of international conferences attended within years under review was 4 ± 1 , with 9 ± 2 for local workshops/seminars. They often tour outside their domain in connection with job specification and performance hence, they are externally oriented relating to the job. It was specified that the studied research institutes do organized workshops and seminars on a regular basis with an average attendants within and outside the country.

Again, sixty six percent of the staff were frequently not attending stakeholders' statutory Monthly Technology Review Meetings (MTRM's) but, 69.5 percent attend annual technical review meetings regularly. Apart from the fact that 89.0 percent was of the opinion that MTRMs had become less important and inconsistency due to unvarying repetitions of same issues, as well as poor financial supports, 51.0 percent also attached the absenteeism to time. Extension and inputs agencies attendance was confirmed as higher and steadfast at such meeting. All (100%) the selected researchers had constant visits to other research institutes but, with an average of 1.5 visits on the introduced innovation.. In supports of Adesoji and Aratunde (2012) ^[24], interaction between research and extension staff as well as inputs suppliers take place mostly at conferences (96%). Eighty nine percent disagreed that there were interactions between researchers and inputs providers but explained that, inputs suppliers often relates more directly with the farmers. This might connote ^[4] customary lag between institutes hence, no interactions..

In-depth analysis of training needs for extension staff development revealed that there were provisions for short-term trainings (on- and off-the-job) within and outside the nation and, were opened to all staff. The staff claimed that such provisions are not often accessible due to underfunding, political manoeuvrings, and tight administrative bureaucracies. Fifty nine percent identified

such opportunities as repeatedly circulates at the agency higher echelon. However, all (100%) the studied extension staff have contacted induction and in-service training through workshops, seminars, and conferences. Little above average (54%) was qualified for the assigned job specification in the agency and 46.0 percent were not. This was adjudged based on the respondent’s trainings background. The extension staff had an average value of 7 ± 1 for local seminars attendance and, seventeen percent had attended between 1-2 international seminars outside the country. Extension regularly organized in-house workshops, trainings and seminars that were made mandatory to all staff and, attendants are often reasonable. While 93.0 percent identified intermittent academic interaction between research and extension, 12.0 percent had an average conferences and workshops attendance with researchers. Fifty one percent frequently attends the Monthly Technical Review Meetings and 49.0 percent was seldom. The statutory monthly and fortnightly interactive sessions were not constants. Just 26.0 percent of the staff regularly attends annual national thematic workshops for rural and agricultural development. Research and extension in the studied area were not practicing staff- rotation or exchange which is another method of interactive training. The study identified the extension staff (83%) to have moderately attended group meetings with farmers and, all (100%) frequently travelled within their ^[5] job administrative area. While 85.0 percent have moderate visits to other LGAs within the State, 51.0 percent had reasonable visits to other States of Nigeria and, 17.0 percent had visited other nation of the world. Staff trips are repeatedly connected with job specification and performance.

3.1.4. Staffing, equipments and locations of institutes

resources for job performances in research and extension institutes were examined. According to finding, both institutes were inadequately staffed and equipped but research has more staff and equipments than extension (100%). Most identified equipments are obsolete with more of such been housed by extension. Research engaged more academically qualified staff than extension in which less than average (46%) of the extension staff have basic training in agriculture and, 54.0 percent do not. The above claimed was adjudged based on staff level of education and trainings background as presented in table 2

Table 2: Distribution of respondents according to level of education attained

| Level of education attained | Research staff | Extension staff |
|-----------------------------------|----------------|-----------------|
| National Certificate of Education | 00(0.0) | 13(14.4) |
| Ordinary National Diploma | 00(0.0) | 06(6.7) |
| Higher National Diploma | 03(3.9) | 11 (12.2) |
| First degree | 09(11.5) | 34.0(39) |
| Master degree | 16.0(20.5) | 17.0(18.9) |
| Doctorate | 50.0(64.1) | 09(10.0) |
| Total | 78(100.0) | 90(100.0) |

Source: Field Survey, 2020.

Analysis revealed that extension housed more locally trained personnel’s than research, and staff of both institutes lack basics specialty training in textile subject matter contents. This implied that research and extension lack

knowledge in on-farm textile subject content. To teach skills, training should be a balance mix of theory and field practice and, trainers must have good understanding of the subject contents. After all, extension workers would confidently explain new practice to farmers only if he can demonstrate it clearly. Without this ability, agents cannot maintain credibility with beneficiaries.

Findings identified research and extension as been located at far distance away from each other. Most research institutes were located in core metropolis mostly the State headquarters with its staff domiciled in this same area. While extension head office was seated at the State capital and its fields training centres were housed within each of the LGA’s main office. Most LGA’s offices were located at the peri-urban area where 89.0 percent of its staff domiciled. This is an indication that the innovation generation and transfer system workforces domiciled outside the targeted beneficiaries environment. In accordance with Cernea (1999) ^[19], this finding identified that the research institutes workers are better paid and exposed to several local and internal benefits than the extension staff.

3.1.5. Accessibility of innovation transfer system and innovations adaptation approach

The mechanism for innovations transfer to farmers was examined from extension staff perspectives. Finding shows that, there were functional public agricultural innovation transfer institutes in the studied area that were involved in general agricultural programme and dissemination. Apart from activities of the Agricultural Development Programmes (ADP’s) of the Ministry of Agriculture, there were Federal (1) and State (1) Universities with Faculties of Agriculture running extension training programme. The respondents (100%) specified that, these Universities dwells more on research than extension activities, again the ADP’s agency hardly had interaction with these higher academic institutes. Some Non- governmental organisations involvement in innovation transferred in the studied area were also identified.

Adaptation approach which represents practices on managing innovation good-fit to a locality was examined. Packages of the introduced innovations were as indicated in the Table 3.

Table 3: Table showing strata’s and packages of on-farm textile innovation introduced.

| Subsets | Strata | Packages |
|---------|--------------|--|
| On-farm | Plant fibre | Latex, plant fibre (cotton, coir, kenaf, jute, hemp, etc), cane/rattan, dyes and others. |
| On-farm | Animal fibre | Skin and hide production, protein fibre (silk, fur and wool) and others. |

Source: Field of survey, 2020.

In-depth analysis revealed extension staff (100%) as not been involved at the planning phase except at the execution of the project. While 94.0 percent were not involved in problem identification and definition for descriptive and diagnostic survey that produced the innovations, neither were they involved in prioritizing and technologies evaluation for multi-locational trials. This is in accordance with Ajila and Farinde (2015) ^[9]. Seventy five percent of the extension staff were not involved in joint field day and

report writing with the researchers on the innovation. About 35.0 percent had an average of 2 visits to on –stations relating to introduced innovation. Majority (79%) participated in on-farm adaptive research (OFAR), 83.0 percent on Fortnightly Training session (FNTs) and, 67.0 percent in Small Plot Adoption Trials (SPATs).

3.2. Socio-economic characteristics: The following supportive facilities for the structure were assessed:

3.2.1. Inputs and marketing mechanism.

Thorough investigation to availability and affordability of inputs for the innovation revealed all(100%) extension and research staff to have disagreed that inputs are; constantly supplied, available where and when needed, adequately enough whenever they are available and, supply in high rate respectively. Identified major types of inputs supplies to farmers were seeds, fertilizers, herbicides, pesticides, cutlass, hoes and spraying machines. Inputs distribution seldom takes place at LGA's offices but, all (100%) staff identified government through political parties and some ad-hoc teams as directly involved in distributing inputs while extension agency focused only on given advisory and technical services to farmers. Inputs from government were often sold at subsidized price. Direct involvement of government in distributing inputs and identification of problem are breach of statutory rules for appropriate innovation emergence and transfer.

Finding revealed that marketing mechanism center for introduced innovation was located outside the State. Produce Liaison Office (PLO) was created at each LGA's head office where farmers deposit produces awaiting buyers. Buyers 'visits were neither fixed nor constant. Howbeit, whenever produce arrived PLO, it was been weighed, and officer in charge keeps record on behalf of the marketing agent who complete the transaction on arrival through e-payment. It shows that there was a steady and standard marketing scheme for on- farm textile produces, but farmers were not involved in determining prices. Dissonances in this marketing system include farmers' subjection to long waiting period for buyers and, must abide with any given price.

3.2.2. Funding and credit supply

In-depth examination on funding and credit supply for the innovation highlighted public extension agency as been sponsored by the three tier of government in Nigeria (Federal, State and Local), while research were solely sponsored by Federal government. Budgets prescriptions for extension activities were always rigid and allocations were neither adequate nor received on time but, budget prescription and allocation for research were moderately flexible and adequate with little delay. However, no allocation was released for on-farm innovation research and extension activities neither are there external bodies for its sponsorship under the reviewed years. Persistently, on-farm textile produce have a fixed price nationwide depend on the grade. In support of NEEDS (2015) ^[26], research and extension staff disclosed that government have recently removed all form of tax payment on farmers produces Examination of credit supply system to support farmers on introduced innovation showed the extension to have regularly formed cooperative societies and, encouraged

farmers to join. They expressed that farmers are easily reached through cooperative groups for information and trainings. According to finding, there was formal credit facilities made available and beneficiaries were introduced to these facilities through cooperative system. Record shows that 21.0 percent of farmers who registered with the cooperative societies are able to accessed credit but, 79.0 percent were denied. The denial was based on following factors; administrative bureaucracies, inability to meet the system requirements, and political manoeuvring. It was identified that those who regularly benefit from such credit were not farmers. Thorough analysis revealed credit suppliers as constantly function independent of either extension or research agencies even on information toward identification of stipulated members. This implied no operational interaction between credit supply and other related institutes for the introduced innovations. Supplies must be made available if improved practices were to be adopted (Akinagbe and Adonu, 2014:) ^[27]. Political nepotism, roles usurp and mismanagements are major highlighted hindrances to on-farm textile innovation development in the State, other challenges include lack of adequate improved seeds and credit supplies to farmers.

3.2.3. Infrastructure facilities

Finding revealed that research have functional and well maintained but insufficient project vehicles than extension. Research staff (93%) has moderate access to project vehicles, while 71.0 percent of extension staff seldom does. Most available vehicles for extension projects are repeatedly not in good condition and hardly functional due to poor maintenance. Transportation is an integral part of extension trainings for visits to enhance technologies adoption and development. Due to insufficient projects vehicles, extension staff (100%) visits to beneficiaries' communities were often made through public transports, and the most accessible means of transportation was motor cycles with high charges.

While research have an averagely comfortable and furnished office for staff(89%), 51.0 percent of extension staff has no personal office. Among 49.0 percent of extension personnel's that possessed personal office, such offices as not well furnished, and most equipments were outdated and bad. Studied extension and research institutes have accesses to electricity and ICT (Information and Communication Technologies) network. Most offices in research institute were provided with ICT gadgets (such as computer, and internet devices), while 26.0 percent of the extension offices were provides with such gadgets. Extension staff over and over again accessed ICT network through personal digital phone for most official assignments..

Beneficiaries' farms sites represent work field for extension agency. While most (89%) farm locations were not motorable, only 11.0 percent did. Eighty seven percent of research staff enjoyed good and motorable road to the office. It was revealed that, extension (86%) has access to larger land hold than research (77%), but the available research landhold was sufficient for targeted experimental works. Data in Table 3 shows infrastructures available at extension work field. Good roads and electricity would enhance good communication network, and ensure quick and efficient accessibility of an environment.

Table 3: Distribution of extension staff according to availability and functioning infrastructures at the work field N=90

| Infrastructures | Availability | | Functioning | |
|----------------------|--------------|------------|-------------|------------|
| | Frequency | Percentage | Frequency | Percentage |
| Electricity | 64.0 | 76.0 | 61.0 | 68.0 |
| Borehole water | 62.0 | 69.0 | 40.0 | 44.0 |
| Post office | 27.0 | 30.0 | 07.0 | 08.0 |
| Hospital/health/ | 38.0 | 41.0 | 32.0 | 36.0 |
| ICT network services | 64.0 | 71.0 | 64.0 | 71.0 |
| Tarred road | 20.0 | 22.0 | 132 | 10.0 |
| Bar/restaurant | 75.0 | 83.0 | 71.0 | 79.0 |
| Cinema house | 08.0 | 09.0 | 18.0 | 05.0 |
| Motor park | 55.0 | 72.0 | 59.0 | 66.0 |
| Community hall | 33.0 | 37.0 | 29.0 | 32.0 |
| Police station | 14.0 | 15.0 | 14.0 | 14.0 |
| Hotel | 11.0 | 12.0 | 08.0 | 09.0 |
| Others | 73.0 | 81.0 | 04.0 | 53.0 |

Source: Field survey, 2020.

3.2.4. Communicating system

Communication channels accessible to research and extension for information processing were examined. Major identified information channels accessible to research for inter and intra-communication are internets, journals, newsletters/bulletins, phones and, films/CD (100%) respectively. The used of any of this channel was based on good fit to recipients’ environment. Accessible media to extension are meetings, visits, radio, television, film, posters, pamphlets, phones and letters. Accessibility and usage rate of these channels differs in the extension and was as presented in Table 4. Channels commonly used for internal communication in extension were meetings, phones and letters (100%) respectively. Information communicating system in the studied research and extension agencies was top-bottom.

Major and common channels of disseminating information to farmers, often used by extension in Ondo State were radio and television (100%) respectively, and somewhat leaflets, posters and film shots. The mean value of television technical advisory services given on the introduced innovation was 17± 1.5. The mean value of radio technical messages given was 34±2.1. Beneficiaries ought to be contacting the innovation in every week through mass media and meetings but this became somewhat impossible due to other innovations that compete for same inadequate resources in the agency. Rate of field visits made by staff was low. The average number of field visits made on the innovation was 8 ± 0.6 out of expected 72 statutory visits within the reviewed years. During discussion it was revealed that most visits made were limited to nearby farmers in the pheri-urban. Group meetings and cooperative societies were seldom used. Odewumi and Okunade (2016) [28] identified face-face and visual communication aids as most effective communication system in informal education. From this finding, there are indications that farmers have no personal contact with staff of extension and researchers for participatory training in the introduced innovation. This was again attached to wide areas with few available staff to cover by means of little logistic supports that over and over again inhibit immediate information clarification from the sender. Defects of the identified cosmopolitans or formal channels (radio, television and, prints) include deprivation of beneficiaries opportunities to clarify information or ask

question towards good interpretations and understandings, because such channel’s inbuilt are simply for one-way communicating approach. Fifty seven percent of the extension staff claimed to have listened and received information from farmers, which had led to remedial changes in some aspects of the introduced innovation. General acceptable language of Ondo State is Yoruba. All (100%) extension staff were fluent in speaking Yoruba language, only 42.0 percent of the researchers can speak the language glibly. It was revealed that the studied society have multiple language indexes and intonation that were difficult to understand. Languages generally represent a vital instrument in teaching and learning process. It aids interpretation and understanding of messages. Since, the field staff could speak the general language of the farmers; these make interpretations of communicated information easier.

Table 4: Distribution of extension staff according to communication channels used in disseminating information to farmers. N=90.0

| Communication channels | Frequent | Moderate | Infrequent |
|------------------------|------------|-----------|------------|
| Group meetings | 17(19.0) | 31(34.0) | 42(48.0) |
| Cooperative society | 23(25.5) | 46(51.0) | 14(15.5) |
| Films | 00(0.0) | 57(63.0) | 33(37.0) |
| Posters | 00(0.0) | 64(71.0) | 26(.29.0) |
| Leaflets | 00(0.0) | 49(54.0) | 41(46.0) |
| Radio | 90(100.0) | 00(0.0) | 00(0.0) |
| Television | 90(100.0) | 00(0.0) | 00(0.0) |
| Letter | 00(0.0) | 05(5.5) | 85(94.5) |
| Field visits | 00(0.0) | 16 (18.0) | 74(82.0) |
| Others | 00(0.0) | 11(12.0) | 79(88.0) |

Source: Field Survey, 2020.

3.3. Development of on-farm textile innovations

3.3.1. Adoption

Rate and used intensity of the introduced innovation by beneficiaries was verified. Analysis revealed rate of innovation introduction to rural residents of Ondo State as low (100%). According to available records expected average number of specialize subject matter to be introduced within years under reviewed was ≥16. The average introduced was 3.2 ±0.6. More than average (60%) of the rural residents were aware, but few (8%) showed interest and tried the innovation. At the ends less than 5.0 percent were users of the innovation. These adopters majored in other economics activities, at the same time they are members of textile producer association. The average fibre yield was 950kg/hectare as against expected 4.5 ton/hectare (approximate) and 2,193kg/hectare of latex as against not less than 4,500kg /hectare. Adoption of the introduced innovation was low (100%) in the State.

3.3.2. Serviceability

Fitness and influence of the introduced innovation on beneficiaries’ communities and psychosocial ethics was studied. The on-farm textile farmers (100%) rated serviceability of the innovation low. This rating viewed socio-technical profiles and benefits-return of the innovation. The respondents signified that newly improved genetically modified textile technologies such as, Bt cotton with superior farming system over the existing ones were introduced. Knowledge and skills gained by respondents

(82%) over the existing textile activities was low as indicated. The farmers' rated project profit- returns value as low and, ability to start and operate on a small scale capacity as average. The accessibility aptitude of the innovation was low. Ninety six percent rated the innovation time-efficient aptitude and, complexity values as average respectively. The innovation displayed an average land-efficient capacity with moderately yield per hectare over the existing one. The innovation compatibility value to the environment was average but, farmers were not satisfied

with the innovation. This was due to inadequacies of technical skills in handling the innovations possessed by farmers and poor accessibility of inputs and credit system. Result indicated the mean values of development limits for on –farm textile innovation as 37.4, with standard deviation of 2.9. Table 5 shows that, 64 .3 percent of the respondents had development limit between 0 and 31.2 (Low level) and, 35.7 percent had development limit between 31.2.and 43.0. (Average level). This implies that the level of on-farm textile innovation development in Ondo State was low.

Table 5: Table showing collective perceptions of extension and research staff on levels of on-farm textile innovation development.

| Levels development | Frequency | Percentage |
|-----------------------------|-----------|------------|
| 0 – 34.5 (Low level) | 108.0 | 64.3 |
| 34.5 – 40.3 (Average level) | 60.0 | 35.7 |
| Above 40.3 (High level) | 0.0 | 0.0 |
| Total | 168.0 | 100.0 |

Mean = 37.4.
 Standard Deviation = 2.9.
 Source: Field survey 2020.

3.3.3. Results of Correlation Analysis

In other to examine relationship between techno-dynamics structure of on-farm textile innovation and its development, the data was subjected to correlation analysis. Result in Table 6 showed relationship at $p \leq 0.01$ and $p \leq 0.05$ level of significant between development of on-farm textile innovation and cultural-systematic variables [Staff training needs ($r = 0.391^*$), Staffing ($r = 0.366^*$), accessible innovation transfer system ($r = - 0.597^*$): Socio- economic characteristics [communication system ($r = 0.352^*$), Infrastructure facilities ($r = 0.294^*$), Funding system ($r = - 0.371^*$), accessible marketing mechanism ($r = 0.475^*$).

Research accessibility, customary interaction credit accessibility, and innovation emergence and adaptation mode show positive but not significant relationship with development. This might be attached to the fact that principles that sustained these variables operations are mismanaged. Positive correlation simply means that the more the magnitude of variation in these factors, the higher the development. The coefficient of determination (r^2) explained degree of variation in the development of the innovation, which was attributed to each of the techno-dynamics structure related variables analyzed.

Table 6: Correlation analysis showing linear relationship between development and techno- dynamics of on-farm textile innovation.

| Variables (x) | Co-efficient (r) | Coefficient of determinant(r^2) |
|---|------------------|-------------------------------------|
| - Visibility of research institutes | 0.127** | 0.016 |
| - Research accessibility | 0.109 | 0.012 |
| - Innovation emergence mode | 0.115 | 0.013 |
| - Staff training needs | 0.391* | 0.153 |
| - Customary interactions | 0.117 | 0.014 |
| - Communication system | -0.352* | 0.124 |
| - Staffing | 0.366* | 0.134 |
| - Institutes locations | -0.288** | 0.083 |
| - Accessible innovation transfer system | 0.597* | 0.349 |
| - Innovation adaptation approach | 0.141 | 0.020 |
| - Infrastructure facilities | 0.294* | 0.086 |
| -Inputs supply system | -0.122 | 0.015 |
| -Marketing mechanism | 0.475* | 0.226 |
| -Funding system | -0.371* | 0.138 |
| - Formal Credit accessibility | 0.198** | 0.039 |
| - Equipments of institutes | 0.383* | 0.147 |

Critical value of r at $p \leq 0.01 = 0.171$.
 Critical value of r at $p \leq 0.05 = 0.124$
 * r is significant at $p \leq 0.01$ level.
 ** r is significant at $p \leq 0.05$ level.
 Source: Field survey, 2020

4. Conclusions and Recommendations

From the above findings it could be concluded that development of on-farm textile innovation in Ondo State was low and its techno-dynamics structure experienced customary lag. The following variables were identified to

have strong influence on development viz as: accessible innovation transfer system, infrastructure facilities, marketing mechanism, institutes equipments, staff training needs and staffing. Research staff have access to better [7] staff hygienic factors including foreign benefits than their

counterpart in the extension institute.. For effective agricultural development, research and extension staff need not only be aware of new technologies, but must participate Kolawole and Torimiro (2005) ^[29] in the technology emergence, evaluation and, adaptation.. Since, extension staff are the ones that must worked directly with farmers, they should be supported by researchers mostly SMSs when offering advice on most technological problems and in turn be able to advise researchers on problems faced by farmers. The experienced customary lag between related institutes made these impossible hence low developments. It is therefore suggested that, government should strengthen and monitor good research-extension interaction including others supportive institutes. Established policies on technologies emergence, adaptation and transfer should be preserved without interference for any political reasons. Adequate equipments and funding provision should be made accessible for research and extension work. Effective public marketing board with human face needs to be established and, extension agency be backed up with adequate functioning infrastructures.

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