

IMPROVING PUBLIC EXTENSION PRACTITIONERS' TECHNICAL FARM MANAGEMENT KNOWLEDGE AND SERVICE DELIVERY: EVIDENCE FROM SMALL-HOLDER FARMERS IN THULAMELA MUNICIPALITY OF SOUTH AFRICA

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Abstract

Introduction: Poor-quality extension service delivery motivated the introduction of the Extension Recovery Plan (ERP) in South Africa. The paper assesses the influence of the ERP on field-level, public extension practitioners' technical farm management knowledge and delivery of farm management information to small-holder farmers in the Thulamela municipality following their qualifications' upgrade.

Methods: The study used a mixed-methods approach and employed a cross-sectional survey design. Due to logistical challenges, 80 out of 135 targeted farmers were available, and thus purposely selected for this assessment. Descriptive and inferential analytical methods were used.

Findings: The findings showed that extension practitioners' technical farm management knowledge had improved; furthermore, there was a positive relationship between extension practitioners' qualifications' upgrade and the delivery of improved technical farm management information as attested to by respondents.

Conclusions: The findings indicate that the ERP has a positive influence on extension practitioners' technical farm management knowledge as well as the delivery of improved management knowledge to producers in Thulamela Municipality.

Keywords: extension recovery plan, service delivery, small-holder, qualification, upgrade, professionalism

INTRODUCTION

Since the 1960s, research on public agricultural extension professionalism has received a great deal of attention around the world, especially in the USA (Martin and Sajilan, 1989 citing Davis, 1963; Collings, 1964; Hurd, 1967). This is in view of the importance of the professional competency of the field extension practitioner in relation to the effectiveness of the extension organization he or she represents. The recent Scoping Study of 15 Extension Professional Competencies in the United States attests to the importance of extension professionalism to deliver effective customer service (Donaldson and Vaughan, 2022). Competence or expertise or special technical knowledge in a particular field has always been mentioned as one of the qualities of a professional (Clark, 1966; Australian Council of Professions, 2003; Herrity, 2022).

Parry's (1996) definition of competency seems to be the most popular amongst writers on the subject. It views competency as a cluster of related knowledge, skills, and attitudes that affects a major part of one's job (a role or responsibility); correlates with performance on the job; can be measured against well accepted standards and

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can be improved via training and development. A summary of the critical view of the definitions of one's competency in the job situation reveals that an underlying qualification is one of the common threads.

Professionalism in extension practice requires that the extension agent is competent in his work, amongst other characteristics (Maddy et al., 2002). Therefore, a basic qualification of an extension practitioner hired to work with crop or livestock farmers or in a mixed farming situation in South Africa, for example, is that the practitioner is proficient in the technical aspects of crop, livestock production or the mixed farming situation so that the practitioner can support the farmers to be productive in their enterprises. A variety of studies have observed the positive influence of competency on work performance (Scheer et al., 2011) or training on job proficiency (Truitt, 2011). The relationship between competency and job performance studies has been undertaken in many disciplines, and these include the works of Tilson and Gebbie (2004) in public health; Chen and Song (2008), Gamble (2010) in education; Cavallo and Brienza (2001) in consumer companies; Debnath et al. (2014), and Israr et al. (2014) in agricultural extension.

Extension practitioners' professionalism and competency in work situations became topical issues in the new, integrated national extension service in South Africa after 1994, when the country emerged from its dark apartheid past. This new extension service comprised extension personnel from the previously segregated black areas (homelands) and the white farming sectors of South Africa. Thus, the new extension service inherited a black majority of extension personnel that was poorly trained for the job. The academic standard of the field-level extension personnel from the homelands was described as poor-quality in the report on profiling of the government-employed extension and advisory service officers in South Africa (DAFF, 2007). The South African government responded to these extension competency and quality issues by putting in place measures to turn the situation around and move towards professionalizing the extension service. Firstly, it formally recognized the need for professionalism in extension in 2005, when it published its report on the "Norms and Standards for Extension and Advisory Services in Agriculture" (Department of Agriculture, 2005). Secondly, it introduced the Extension Recovery Plan (ERP) in 2008/2009 (DAFF, 2011) to revitalize the

public extension services to provide quality services to its clients. To achieve this goal of the ERP, five strategies called 'pillars' were put in place; among these five pillars are the promotion of professionalism and improvement of the image of extension, as well as reskilling and reorientation of extension. The recently gazetted national extension and advisory services policy of South Africa notes that amongst other roles, extension and advisory services are to provide technical advice and mentorship as well as general management support for producers' improved decision making (DAFF, 2016).

The ERP strategies notwithstanding, extension service effectiveness is ultimately founded on the professional competency (technical farm management knowledge, skills, and other professional qualities) of the practitioners on the ground, who deliver the service to farmers. A Google scholar search for peer-reviewed papers published in the South African Journal of Agricultural Extension between 2009 and 2016 and in the Proceedings of the South African Society for Agricultural Extension for the same period on empirical evidence of the influence of the ERP on improving practitioners' extension service delivery performance based on their professional competencies and therefore, on the quality of services in the field as seen by the farmers they serve, yielded no results. This situation creates a knowledge vacuum and, therefore, it becomes difficult for policy-makers to assess the impact of the investment in the ERP on improving extension practitioners' professional qualities as seen by farmers in improvement in extension service delivery. In view of the positive influence of training on professional competence and the latter's effect on job performance in the literature, we argue in this paper that extension practitioners' technical knowledge of farm management (crop and/or animal/livestock) since they upgraded their technical qualifications (4-year bachelor's degree) following implementation of ERP (2008/2009) will lead to delivery of improved technical knowledge of crop and/or livestock management to small-holder crop and livestock farmers in the Thulamela municipality.

Aim of study: To assess the influence of the ERP on extension practitioners' technical knowledge of crop and/or livestock management since extension practitioners upgraded their technical qualifications (4-year bachelor's degree) following the implementation of the ERP (2008/2009). The aim was achieved through the following research objective, question, and hypothesis:

Research objective: To determine whether farmers' opinions on extension practitioners' technical knowledge of crop and/or livestock management have changed since extension practitioners upgraded their technical qualifications (4-year bachelor's degree) following the implementation of the ERP (2008/2009).

Research question: How have farmers' opinions on extension practitioners' technical knowledge of crop and/or livestock management changed since extension practitioners upgraded their technical qualifications (4-year bachelor's degree) following the implementation of the ERP (2008/2009)?

Research hypothesis: Farmers' opinions on extension practitioners' technical knowledge of crop and/or livestock management have not significantly changed since extension practitioners upgraded their technical qualifications (4-year bachelor's degree) following the implementation of the ERP (2008/2009).

METHODOLOGY

This study was conducted within selected wards in Thulamela Local Municipality in the Vhembe District, which is situated in the eastern-most part of Limpopo Province, South Africa. The wards include Tshiombo, Matangari, Mukula, Tshidimbini, Muangawandodzi, Mukondeni, Makwarela, Phiphidi, Vhudimbilu, Lwamondo, Khumbe and Tshikonelo.

Study population and study design

The study population comprised 135 crops and livestock farmers in Thulamela Municipality, who were serviced by public extension practitioners. The study used a mixed-methods approach and employed a cross-sectional survey design.

Sampling selection and size

According to Isaac and Michael (1981) and Smith (1983), for populations of 125 and 150, the recommended sample sizes are 96 and 110, respectively, at 5% precision. The average population of 137 provides an average sample size of 103. Our population of 135 is between 150 and 125, thus the researchers calculated an average sample size of 103 based on proportions. However, due to logistical problems and non-availability of farmers, 80 farmers were registered for the study. All the 80 crop and livestock farmers in Thulamela Municipality who

were serviced by public extension practitioners were therefore specially selected for the survey.

Data collection

The data were collected from 26 April 2017 to 11 May 2017, through face-to-face interviews using a semi-structured questionnaire. Data collected from the 80 farmers encompassed their views on extension practitioners' delivery of technical farm management knowledge before 2013 and from 2013 up to 2017 when the interviews were conducted. The cut-off dates were chosen because the Limpopo Department of Agriculture started to award ERP bursaries for qualification upgrades in 2009/10 and most qualification upgrades took a minimum of two years (DAFF, 2014), hence the cut-off date for any benefits of upgrades for the farmer would be, at least, after 2012, of registration at an institution. The farmers did not know that the extension practitioners went for qualification upgrades. They were only asked to assess their extension practitioners based on the two time periods.

Reliability of the measuring instrument

The reliability of the survey measuring instrument used in this study was measured by means of the most used indicator of internal consistency, the Cronbach's alpha coefficient (Pallant, 2007). A value of 0.7 is acceptable while values more than 0.7 show a high reliability (DeVellis, 2003 in Pallant, 2007). In this study, the Cronbach's alpha for the 18 items used in the delivery of farm management knowledge improvement in crop management was .887, while it was .822 for the 14 items used in the farm management knowledge improvement in livestock management.

Measurement of variables

Professional qualities were used and restricted in this study to include extension practitioners' technical knowledge in crop and livestock management disciplines acquired through tertiary education such as university training (technical competency) for application in the work environment. Key variables in the study were: Independent variable: Extension practitioners' upgrade of technical qualifications in crop and/or livestock management (4-year bachelor's degree) following implementation of ERP (2008/2009), measured as 1. Upgrade, 0. Otherwise; Dependent variable: Farmers' views on extension practitioners' crop and/or livestock

management knowledge improvement or (Farmers' views on extension practitioners' delivery of improved crop and/or livestock management knowledge or information) since the practitioners upgraded their technical qualifications (4-year bachelor's degree) following implementation of ERP (2008/2009). Key variables in the dependent variable were measured as follows:

Delivery of improved crop and livestock management knowledge

Extension practitioners' delivery of improved crop management knowledge or information before 2013 and from 2013 to 2017 was measured as 1 = has improved; 0 = not improved, as viewed by farmers. This improvement, or otherwise, was determined by the crop management knowledge index on the following selected extension practitioners' farm management knowledge variables: crop production activity (information on seed cultivar choice, soil tests, fertilizer issues, seeding, planting dates and distance, crop rotations, climate variability coping information); financial management activity (record keeping); marketing decision activity (produce quality issues, marketing channel to use, niche markets). A respondent's mean score for the extension practitioner was compared with the total mean score (crop management knowledge index) and standard deviation for all respondents on these variables. Any respondent mean score equal to or higher than the total mean score judges the extension practitioner's farm management knowledge as improved; any respondent mean score less than the total mean score judges the extension practitioner's delivery of crop management knowledge as not having improved.

Similarly, extension practitioners' delivery of improved livestock management knowledge before 2013 and from 2013 to 2017 was measured as 1 = has improved; 0 = not improved as viewed by farmers. This improvement or otherwise, was determined by livestock management knowledge index on the following selected extension practitioner's livestock management knowledge variables: livestock production activity (information on the best breed of livestock, livestock vaccination plan, type of vaccination, vaccination dosage, livestock stocking rate/density, isolation of sick animals, information on sick animals, information on disposal of manure, prevention of entry of dysentery into the farm, information to get animal feed, conditions of feed, housing condition for animals); marketing activity (best time to sell, niche market and information on prices); financial

management activity (record keeping). The respondent's mean score for the extension practitioner was compared with the total mean score (livestock management knowledge index) and standard deviation for all respondents on these variables. Any respondent mean score equal to or higher than the total mean score regards the extension practitioner's delivery of livestock management knowledge as having improved; for any respondent mean score less than the total mean score, the extension practitioner's delivery of livestock management knowledge is judged as not improved.

Data Analysis

The data collected were subjected to both descriptive and inferential analyses. Descriptive analysis in the form of percentages and tables was used to answer the research question and to describe respondents' views on practitioners' delivery of farm management knowledge (crop or livestock). The Z test was used in the inferential analysis to test research hypothesis and is described in the paragraph that follows.

The hypothesis was that extension practitioners' delivery of crop or livestock management knowledge did not significantly change following the upgrading of their technical qualifications (bachelor's degree). The researcher was interested in making a comparison and analysing differences in two populations of extension practitioner (those who went for qualification upgrade and those who did not) in terms of a categorical characteristic, i.e., whether qualification upgrades lead to the delivery of improved technical farm management knowledge or not. The aim here was to determine whether there is any difference in the proportions of successes (here, delivery of improved farm management knowledge: crops or livestock) in the two groups (two-tailed test) at a 5% level of significance. The evaluation of differences in the delivery of improved farm management knowledge between the two proportions was based on independent samples. A test procedure whose test statistic Z is approximated by a standard normal distribution was used, as recommended by Bereson and Levine (1979). The Z statistic is given by:

$$Z = \frac{P_1 - P_2}{\sqrt{P_1(1 - P_1)/n_1 + P_2(1 - P_2)/n_2}} \quad (1)$$

with

$$P_1 = X_1/n_1$$

$$P_2 = X_2/n_2$$

where:

- P_1 – sample proportion of successes in population 1 (serviced by practitioners with qualification upgrade)
- X_1 – number of successes in sample 1 (with qualification upgrade and judged by respondents as knowledgeable in farm management information) (= 62)
- n_1 – size of sample taken from population 1 (with qualification upgrade) (= 69)
- P_2 – sample proportion of successes in population 2 (without qualification upgrade)
- X_2 – number of successes in sample 2 (without qualification upgrade and judged by respondents as knowledgeable in farm management information) (= 4)
- n_2 – sample size taken from population 2 (serviced by practitioners without qualification upgrade) (= 11).

To test whether the null hypothesis of no difference in the proportions of the two independent populations (i.e., with qualification and without qualification upgrade) are the same regarding farm management knowledge and improvement in service delivery at the level of significance .05 with a critical value of ± 1.96 :

$$H_0: p_1 = p_2$$

The alternative hypothesis that the two population proportions are not the same is:

$$H_1: p_1 \neq p_2$$

RESULTS

Extension practitioners' farm management knowledge before 2013 and after

The information described in this section reflects pillar four of the ERP, which is reskilling and reorientation of extension. The purpose of the pillar was to address the lack of appropriate technical farm management knowledge (crop or livestock) among field-level extension practitioners, which should lead to the delivery of improved, quality technical service to farmers. To give effect to this pillar, extension practitioners with diploma qualifications were encouraged to enroll at tertiary

institutions to upgrade their qualifications to at least a bachelor's degree in order to be recognized as agricultural advisors. The findings presented in this section are thus based on the research question posed in the Introduction section of this study.

Farmers' opinions on extension practitioners' crop and livestock management knowledge following technical qualifications upgrade

The research question posed in this study was addressed by asking farmer respondents to evaluate the extension practitioners who provided them with farm management information and whether they saw a change (improvement or no improvement) in the extension practitioner's delivery of livestock or crop management information. The comparison was between extension practitioners' current technical knowledge in livestock or crop management support compared to the quality of the same support before 2013. The current support refers to the period after 2013 up to the time of the survey in 2017. This was the period during which extension practitioners with diploma qualifications went to tertiary institutions to upgrade their qualifications to bachelor's degrees.

Table 1 reveals the summary of opinions livestock producers. The findings indicate that most respondents generally believed extension practitioners demonstrated an improved level of knowledge in livestock management following the upgrading of their qualifications. Over 90% of extension practitioners had an improved level of technical knowledge in the different areas of livestock management, according to the farmers' assessments. In the marketing and financial management knowledge areas, more than 70% of extension practitioners improved their level of technical knowledge, according to the farmers' assessments.

Table 2 shows a summary of respondents' opinions of crop farmers. Overall, crop farmers were of the view that their extension practitioners demonstrated an improved level of technical knowledge. More than 90% of farmers indicated that their extension practitioners had improved their technical knowledge in various areas of crop management and marketing activity. Respondents' assessment also indicated that financial management compared to other areas of crop management, was the only area where most extension practitioners fared slightly lower (78.9%) in their technical knowledge.

Table 1. Farmers' opinions on extension practitioners' technical knowledge of livestock management following qualification upgrade ($n = 42$)

	Knowledge area	Improved	Not improved
Livestock production	Information on the best breed of animal	95.2	4.8
	Animal vaccination plan	97.6	2.4
	Type of vaccine to use	97.6	2.4
	Vaccination dosage to use	97.6	2.4
	Animal Stocking rate/density	95.2	4.8
	Isolation of sick animals	90.5	9.5
	Information on disposal of manure	95.2	4.8
	Prevention of entry of disease into the farm	97.6	2.4
	Where to get animal feed	97.6	2.4
	Conditions of or how to keep animal feed	95.2	4.8
	Housing condition for animals	100.0	0.0
Marketing management	Best time to sell animals	90.5	9.5
	Where to sell animals	71.4	28.6
	Information on prices	88.1	11.9
Financial management	Record keeping	88.1	11.9

Source: own elaboration.

Table 2. Farmers' opinions on extension practitioner's technical knowledge of crop management following qualification upgrade ($n = 38$)

	Knowledge area	Improved	Not improved
Crop production	Seed cultivar choice for your area	92.1	7.9
	Fertilizer recommendation	97.4	2.6
	Planting dates	97.4	2.6
	Seeding rate	97.4	2.6
	Planting distance	97.4	2.6
	Pest control	94.7	5.3
	Disease control	94.7	5.3
	Irrigation issues	97.4	2.6
	Land preparation issues	97.4	2.6
	Crop rotations yielding maximum returns	97.4	2.6
	Return on hectare of land	81.6	18.4
	Climate variability information	94.7	5.3
	Marketing management	Best time to sell produce	94.7
How to sell produce		94.7	5.3
Information on price		92.1	7.9
Where to sell produce		94.7	5.3
Produce quality issues		92.1	7.9
Financial management	Record keeping	78.9	21.1

Source: own elaboration.

Results of inferential analysis

Tables 1 and 2 indicated farmers' positive assessments of extension practitioners' improved crop and livestock management knowledge before and after 2013 up to 2017, the period in which most extension practitioners upgraded their qualifications in crop and livestock management at tertiary institutions. This positive assessment was tested in the research hypothesis of the study. The rest of this section provides the results of this test.

Influence of extension practitioners' technical qualification upgrade on the delivery of crop and livestock management information

A hypothesis test was set up to assess the influence of extension practitioners' technical qualification upgrade on the delivery of improved crop and livestock management information from the farmers' perspective.

The researcher was interested in making a comparison and analysing differences in two populations of extension practitioners in terms of a categorical characteristic, i.e., whether qualification upgrades in technical knowledge in farm management lead to an improvement in the delivery of crop and livestock management information to farmers. The aim here was to determine whether there was any difference in the proportions of successes (delivery of improved farm management information: crop or livestock) in the two groups (two-tailed test). The evaluation of differences in knowledge between the two proportions was based on independent samples.

To test the null hypothesis of no difference in the proportions of the two independent populations (i.e., with qualification and without qualification upgrade) regarding the delivery of improved crop or livestock management information, a test procedure whose test statistic Z is approximated by a standard normal distribution was used as recommended by Bereson and Levine (1979). The level of significance .05 with a critical value of ± 1.96 was used. The null hypothesis that the two populations are the same regarding the delivery of crop and livestock management knowledge or information was: $H_0: p_1 = p_2$

The alternative hypothesis that the two population proportions are not the same regarding the delivery of crop or livestock management knowledge or information was: $H_1: p_1 \neq p_2$. The test result was $Z = 3.58$. The Z value is larger than 1.96 at a 0.05 level of probability; the NH was thus rejected, and the AH accepted. This

means that extension practitioners who had upgraded their qualifications to bachelor's degree delivered improved farm management knowledge (crop or livestock), as judged by the farmers they served compared to those who did not. Extension practitioners who went for qualification upgrades in Thulamela Municipality showed the delivery of improved technical crop and livestock management knowledge or information according to the farmers they served.

DISCUSSION

The problem that motivated the study was the lack of empirical evidence for policy-makers of the influence of the ERP on improving extension practitioners' technical farm management knowledge after extension practitioners upgraded their technical qualifications and whether any improvement in technical farm management knowledge leads to the delivery of improved or quality technical farm management information to farmers. A scoping study that reviewed and synthesized the literature (1997–2018) on government agricultural policy and production shows a mixed impact of extension services on production; three studies showed an increase in production, while four showed a decrease or no effect (Lencucha et al., 2020). The same scoping study report showed that amongst other factors, quality of services provided, and well-trained extensions officers were associated with a positive impact on farmers' production. These findings underscore the important implications of our findings for extension policy and management.

The research question that was set up to address any improvement in extension practitioners' technical farm management knowledge is discussed here.

Respondents' opinions on improvements in Extension practitioners' technical farm management knowledge

Livestock production, marketing, and financial management

Over 90% of the respondents held a positive view that extension practitioners' livestock production knowledge had improved, while more than 80% thought the practitioners' marketing or financial knowledge had also improved following the upgrade of their technical qualifications. These findings resonate well with the literature on the importance of education in developing expertise (Alexander, 2005; Boshuizen et al., 2004). Our findings

have important positive implications for the growth of the livestock sector in South Africa when one considers Adisa's (2015) statement about the important role of a competent and well-trained extension personnel in enhancing the development of the livestock sector in Nigeria. Four of the livestock management variables (feeding, housing, records, and vaccination) in our study, featured in the five topmost livestock management needs of farmers in Adisa's (2015) study in Nigeria. This indicates that the extension practitioners in our study acquired essential livestock technical knowledge relevant for the industry in their qualifications' upgrade, as attested to by respondents.

Crop production, marketing, and financial management

Better crop production and other crop management practices are a *sine qua non* for improved crop productivity. Sixty-seven percent of the crop production practices in our study (seed cultivar choice for land area, fertilization issues, seeding rate, pest control, disease control, irrigation issues, land preparation issues, crop rotations) were also studied by Khan et al. (2021) and were found to affect cotton production significantly and positively. This shows that crop productivity depends on the potential use of available resources and the use of better management practices. Even though production-oriented research and extension could be relevant for agricultural development, it has been shown that access to markets no doubt makes the production of crops attractive to farmers and that the lack of well-functioning markets can severely hinder farmers' increased production (Appau et al., 2020; FAO, 1987). Marketing Extension is thus seen as complementary to production in extension activities (Elbert, 1998). Three marketing issues in our study (quality-related issues, how to sell produce and price-related issues) were related to nine of Ajayi's (2006) top ten marketing related issues studied in Nigeria. The marketing of organic products was among the four training needs mentioned by extension agents in a study in Saudi Arabia (Alotaibi et al., 2019) and this shows the importance of marketing in the work of field-level extension practitioners to support producers in their farming enterprise decision making. Most respondents in our study had a positive assessment of the extension practitioners' crop production knowledge as well as marketing and financial management following their qualifications' upgrade. This also shows that

education has a positive effect on expertise development (Alexander, 2005; Boshuizen et al., 2004).

CONCLUSIONS

In the researchers' view, the technical competency of field-level, public extension practitioners is the bottom-line in all that the practitioner does with farmers as an extension professional. In this paper, the researchers have aimed to establish at least two important facts that are worthy of note, especially by agricultural extension policy-makers and provincial extension managers. Firstly, the evidence of this study in the Thulamela municipality of Limpopo province provides an indication that through the extension practitioners' reskilling strategy, by which extension practitioners are provided the financial support to upgrade their technical qualifications at tertiary institutions, at least to bachelor's degree level, the DAFF ERP is helping to improve their technical competencies. Secondly, and finally, the empirical evidence from this study suggests that upgrading the technical qualifications of extension practitioners is contributing to a significant degree to the delivery of improved technical farm management support to producers, as attested to by respondents. This could help producers obtain better productivity and, therefore, food security, all things being equal.

The findings of this study show there is evidence to suggest that the introduction of the ERP is making a positive contribution to improving the effectiveness of the public agricultural extension service delivered to small-holder farmers in the Thulamela municipality of South Africa.

RECOMMENDATIONS

Based on the evidence provided in this study, it can be recommended that for the DAFF to achieve a completely and full-fledged professional extension service, it should continue to make more funds available to encourage all field-level extension practitioners with diploma qualifications to enrol in tertiary institutions to upgrade their qualifications at least to the bachelor's degree level. This should perhaps be linked to promotions to encourage practitioners to enroll. The establishment in this study of an empirical link between job technical knowledge and job performance opens the door for extension employers to pay attention to extension

practitioners' qualification upgrades. The study thus contributes to the field of agricultural extension management, as extension managers can make funding decisions for extension practitioners' qualification upgrades that are based on empirical evidence.

Farmers have given a good report in this study in favour of improved crop and livestock farm management knowledge in the service delivered by extension practitioners. Another way to corroborate in a future study what the farmers have said regarding, for example, improved crop production knowledge of extension practitioners might be to collect evidence of their crop yields, and production costs using counterfactual analysis. This will provide empirical evidence to show that farmers are implementing the better crop management practices they claim extension practitioners are providing to them and are using production inputs in as efficient a manner as possible.

Most public extension organizations, especially in developing countries, generally face this problem of poor quality and ineffective agricultural extension service delivery, like the situation in South Africa. Therefore, extension managers elsewhere could take a cue from this study and put measures in place to revitalize their extension services through qualification upgrades of their field-level extension practitioners to improve the technical competency of their field-level extension practitioners to achieve the objectives of their own extension organizations.

REFERENCES

- Adisa, R.S. (2015). Livestock extension practice and competency among agricultural extension agents in North-Central Nigeria. *S. Afr. J. Agric. Ext.*, 43(1), 12–21. Retrieved from: <https://www.ajol.info/index.php/sajae/article/view/121483>
- Ajayi, A.O. (2006). Extension agents' marketing related services: the relevance to policy and training in Osun State, Nigeria. *S. Afr. Tydskr. Landbouvoorl./S. Afr. J. Agric. Ext.*, 35(1), 51–70. Retrieved from: <https://www.ajol.info/index.php/sajae/article/view/3693>
- Alexander, P.A. (2005). Teaching towards expertise. In: P. Tomlinson, J. Dockrell, P. Winne (Eds.), *Pedagogy-teaching for learning* (pp. 29–45). Retrieved from: <https://psycnet.apa.org/record/2007-10763-002>
- Alotaibi, B.A., Yoder, E., Brennan, M.A., Kassm, H.S. (2019). Training needs of extension agents' regarding organic agriculture in Saudi Arabia. *Evaluation and Program Planning*, 77 101711. <https://doi.org/10.1016/j.evalprogplan.2019.101711>
- Appau, A., Drope, J., Goma, F., Magati, P., Labonte, R., Makoka, D., Zulu, R., Li, Q., Lencucha, R. (2020). Explaining why farmers grow tobacco: Evidence from Malawi, Kenya and Zambia. *Nicotine and Tobacco Research*, 22(12), 2238–2245. <https://doi.org/10.1093/ntr/ntz173>
- Australian Council of Professions (2003). What is a profession. Retrieved from: <https://professions.org.au/what-is-a-professional/>
- Bereson, M.L., Levine, D.M. (1979). *Basic business statistics, concepts and applications* (6th ed.). New Jersey: Prentice-Hall International Inc.
- Boshuizen, H.P.A., Broome, R., Gruber, H. (Eds.). (2004). *Professional learning: Gaps and transitions on the way from novice to expert: Innovation and change in professional education*. Dordrecht, the Netherlands: Kluwer Academic. Retrieved from: <https://www.morainebooks.com/pages/books/770/henny-p-a-boshuizen/professional-learning-gaps-and-transitions-on-the-way-from-novice-to-expert-innovation-and-change>
- Cavallo, C., Brienza, M. (2001). Emotional competence and leadership excellence at Johnson & Johnson: The emotional intelligence and leadership study. Consortium for Research on Emotional Intelligence in Organizations. Retrieved from: https://www.eiconsortium.org/reports/jj_ei_study.html
- Chen, Z., Song, S. (2008). Efficiency and Technology gap in China's agriculture: a regional meta-frontier analysis. *China Econ. Rev.*, 19(2), 287–296. 10.1016/j.chieco.2007.03.00
- Clark, R.C. (1966). Extension as a profession. *Nig. Agric. J.*, 3(2), 79–83. Retrieved from: <https://www.ajol.info/index.php/naj/article/view/195323>
- Collings, M.L. (1964). On being a professional. *J. Coop. Exten.*, 2(1), 3–9. Retrieved from: <https://archives.joe.org/joe/1964spring/1964-1-a1.pdf>
- DAFF (Department of Agriculture, Forestry, Fisheries). (2016). National policy on extension and advisory services. PART- B. Pretoria, Republic of South Africa: Directorate, National Extension Reform. Retrieved June 12th 2023 from: https://www.gov.za/sites/default/files/gcis_document/201710/daffannualreport201617finalbinder20sepa.pdf
- DAFF (Department of Agriculture, Forestry and Fisheries). (2014). National framework for extension as a field of practice. Pretoria, Republic of South Africa: Directorate, National Extension Reform.
- DAFF (Department of Agriculture, Forestry and Fisheries). (2011). Annual report: Performance of the Extension

- Recovery Plan 2010/11. Pretoria, Republic of South Africa: Department of Agriculture, Forestry and Fisheries. https://dardlea.mpg.gov.za/documents/publications/annual_reports/2010-2011.pdf
- DAFF (Department of Agriculture, Forestry and Fisheries). (2007). Report on the profiling of the current government-employed extension and advisory service officers. Pretoria, Republic of South Africa: Department of Agriculture, Forestry and Fisheries. <http://www.nda.agric.za/doaDev/sideMenu/educationAndTraining/ProfileReport-19Nov2009.pdf>
- Debnath, A., Saravanan, R., Datta, J.F. (2014). Job competence and job performance of the extension personnel of the Department of Agriculture in Tripura State of North-East India. *Int. J. Soc. Sci.*, 3(2), 91–112. <http://dx.doi.org/10.5958/2321-5771.2014.00095.7>
- Department of Agriculture (2005). Norms and standards for extension and advisory services in agriculture. Pretoria: Scientific Research and Development.
- Donaldson, J.L., Vaughan, R. (2022). A scoping study of United States Extension Professional Competencies. *J. Human Sci. Exten.*, 10(1), 1–17. <https://doi.org/10.54718/BNRG8317>
- Elbert, J. (1998). Agricultural marketing extension: A role for extension officer in the Caribbean. Conference Proceeding of AIAEE. Tucson Arizona, USA.
- FAO (1987). Food and agriculture organisation: Marketing extension services for small farmers. AGSM Occasional Paper No 1 Marketing and Rural Finance Service Agricultural Service Division.
- Gamble, J. (2010). Teacher professionalism: a literature review. Retrieved from: <https://www.jet.org.za>
- Herrity, J. (2022). Guidelines to professionalism in the workplace. Retrieved from: <https://www.indeed.com/career-advice/career-development/the-ultimate-guide-to-professionalism>
- Hurd, H.G. (1967). What is a professional? *J. Coop. Exten.*, 5(2), 77–84. Retrieved from: <https://archives.joe.org/joe/1967summer/1967-2-a1.pdf>
- Isaac, S., Michael, W.B. (1981). Handbook in Research and Evaluation. A collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioral sciences (3rd ed.). San Diego: EdITS Publishers. <https://doi.org/10.1002/1520-6807>
- Israr, M., Ahmad, M.N., Nawab, K., Ali, S., Khan, B., Aamir, M., Ibrahim, M. (2014). Professional progress and its effect on agricultural extension agents services. *J. Asian Dev. Stud.*, 3(1), 101–115. Retrieved from: https://www.academia.edu/12375598/Professional_Progress_and_Its_Effect_on_Agricultural_Extension_Agents_Services
- Khan, L.A., Awan, Z.A., Imran, A.U., Saleem, M., Sufyan, F., Azmat, M. (2021). The Impact of Better Management Practices (BMPs) Among Cotton Farmers in Punjab, Pakistan. *J. Agric. Sci.*, 13(7), 74–88. <https://doi.org/10.5539/jas.v13n7p74>
- Lencucha, R., Pal, N.E., Appau, A., Thow, A., Drope, J. (2020). Government policy and agricultural production: a scoping review to inform research and policy on healthy agricultural commodities. *Glob. Health*, 16(11), 1–15. <https://doi.org/10.1186/s12992-020-0542-2>
- Maddy, D., Niemann, K., Lindquist, J., Bateman, K. (2002). Core competencies for the Cooperative Extension System. Personnel and Organizational Development Committee of the Extension Committee on Organization and Policy. Retrieved from: https://apps.msuxextension.org/careers/forms/Core_Competencies.pdf
- Martin, R.A., Sajilan, S.B. (1989). Teaching competencies needed by extension workers in transferring agricultural technologies to Malaysian Farmers. *J. Agric. Edu.*, 30(2), 68–72. <http://dx.doi.org/10.5032/jae.1989.02068>
- Pallant, J. (2007). *SPSS Survival Manual: A Step-by-Step Guide to Data Analysis Using SPSS Version 17* (3rd ed.). Berkshire: McGraw-Hill.
- Parry, S.B. (1996). The quest for competencies. *Training*, 33(7), 48–56. Retrieved from: <https://www.proquest.com/trade-journals/quest-competencies/docview/203398191/se-2>
- Scheer, S.D., Cochran, G.R., Harder, A., Place, N.T. (2011). Competency modelling in extension. Education: Integrating an academic extension education model with an extension human resource management model. *J. Agric. Edu.*, 52(3), 64–74. [10.5032/jae.2011.03064](https://doi.org/10.5032/jae.2011.03064)
- Smith, M.F. (1983). Sampling considerations in evaluating cooperative extension programs. Florida Cooperative Extension Service, Gainesville, Florida. Retrieved from: <https://original-ufdc.uflib.ufl.edu/IR00011319/00001>
- Tilson, H., Gebbie, K.M. (2004). The public health workforce. *Ann. Rev. Publ. Health*, 25, 341–356. <https://doi.org/10.1146/annurev.publhealth.25.102802.124357>
- Truitt, D.L. (2011). The effect of training and development on employee attitude as it relates to training and work proficiency. *SAGE Open* 1–13. <https://doi.org/10.1177/2158244011433338>