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KNOWLEDGE AND ATTITUDE TOWARDS COLLABORATION IN AGRICULTURAL INNOVATION SYSTEMS AMONGST STAKEHOLDERS IN THE NORTH WEST PROVINCE, SOUTH AFRICA.

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ABSTRACT

The current study examined the extent of knowledge concerning agricultural innovation systems amongst researchers, extension agents, farmers, input dealers, and marketers, while determining their attitude towards collaborating with agricultural innovation systems. Through using a simple random sampling technique; researchers, extension agents, farmers, input dealers, and marketers were selected as the study population. Information was gathered by distributing a structured questionnaire amongst the various participants and analysing the data gained concerning their wealth of knowledge and their corresponding willingness to collaborate. The results show that researchers, extension agents, farmers, input dealers, and marketers are aware of, and have adequate knowledge of, these systems available to them, to be able to utilise them effectively. However, they expressed different attitudes towards collaboration with agricultural innovation systems.

Keywords: Knowledge, attitude, collaboration, innovation systems

1. INTRODUCTION

The Agricultural Innovation System (AIS) is promoted as a framework that can be used to solve complex agricultural problems. AIS can further be described as a complex set of functions and linkages developed to increase agricultural production and farm household income, while maintaining the available resource base and addressing equity concerns. To achieve increased production, collaboration amongst different stakeholders are a necessity. An example of such a collaboration would be investment in the capacity of extension workers and organisations for value chain approaches, in market-oriented extension, in group and organisational development, in agribusiness, and in mechanisms to share information (Davis & Heemskerk, 2009:179). The gap between these organisations create a problem in developing effective research and mechanisms to share information in developing research and extension systems (Davis & Heemsherk, 2009:179). However, various stakeholders in innovation systems play different contributing roles that can be classified as facilitator, communicator, collaborator, coordinator, knowledge source, policy formulator, and implementer. Collaboration amongst stakeholders assists in understanding the relationship between the role-players in an innovation system and draws out their attitude towards the network (Bhattacharjee & Saravanan, 2015:345).

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The innovation system approach has found importance amongst various policy developers (Adekunle & Fatumbi, 2012:982). Innovation systems are accordingly encouraged as a measure to increase the availability and viability of knowledge amongst role-players in achieving the goal of agriculture as a main contributor behind food security, environmental sustainability and economic opportunity. However, there have only been a few attempts to relate these fields of knowledge thus far, by analysing how interactive arenas can facilitate stakeholder collaboration that in turn may foster innovation between stakeholders. This is achieved by bringing together public and private role-players with relevant innovation assets to facilitate the sharing of knowledge, transformative learning, and establishing joint ownership of new innovative visions and practices (Sorensen & Torfin, 2012:1). Despite extensive investigation on the possibilities of multi-stakeholder collaboration, the European Union's Standing Committee on Agricultural Research (EU SCAR, 2012:7) found that there is still little known about the performance of agricultural knowledge and innovation systems (Schut, Klerkx, & Rodenburg, 2014:2). Thus, the potential of its approach to address agricultural problems remain underutilised and a series of questions about the effectiveness of collaboration in the agricultural field remain unanswered. Hoffmann, Probst, & Christinck (2007:355) emphasise that the basic idea of collaboration includes farmers and professional researchers to have different knowledge and skill-sets that complement each other and compensate for any constraints and limitations of each group. Without collaboration in development and decision-making programmes, there will be no innovation. Agwu, Dimelu, & Medukwe (2008: 605) highlight that innovation systems represent a change from the linear approach to research and development practices, as it provides a framework to explore complex relationships amongst different stakeholders, social, and economic institutions. It also demonstrates the importance of studying innovation as a process, in which knowledge is accumulated and applied by stakeholders. These complex interactions are usually conditioned by social and economic institutions. Furthermore, Jaisridhar & Sangeeta (2013:394) argue that successful innovations are not only based on the integration of ideas and insights from scientists, but also users, intermediaries, and other societal agents. In addition, willingness to partake is a major obstacle in collaboration. Strong incentives to innovate, arising from exposure to highly competitive markets, have rarely been sufficient to induce new patterns of collaboration.

2. DEFINITION OF PROBLEMS

The South African government has introduced support programmes to assist stakeholders to share their efforts in promoting agriculture. Despite the linkage mechanisms created by the government, weak linkages and non-operative collaboration amongst stakeholders still exist. The aim of this study is to explore how linkages, partnerships, and other forms of interaction between different stakeholders can accommodate the development and implementation of new and bold concepts in ways that reinvigorate agricultural production. As South Africa is in the process of societal transformation, the support provided to farmers should also change in the sense of being more cooperative in implementing new practices that can reinvigorate agricultural production. The main objective of this study is to examine the extent of knowledge of agricultural innovation systems amongst researchers, extension agents, farmers, input dealers, and marketers, whilst determining their attitude towards collaboration in agricultural innovation systems.

3. PROCEDURE

The study was conducted in the North West Province of South Africa. The study population consisted of researchers from the North West University and Agricultural Research Council (ARC), farmer organisations, input dealers, marketers, and extension agents from the directorate of extension services in the Department of Agriculture Forestry and Fisheries (DAFF). A list of researchers, extension agents, and farmers were obtained from their respective organisations within the North West province. The list served as a sampling frame for the study. The frame for different groups was as follows, Extension agents from the Department of Agriculture and Rural Development (195), researchers from agricultural research and the North West University (135), registered farmers from African Farmers Association of South Africa (AFASA), the National African Farmers Union (NAFU) and the North West Emerging Red Meat Producer Organisation (195). However, there was no definite sampling frame used for input dealers and marketers.

A simple random sampling technique was used to select respondents, because each individual has the same probability of being chosen at any stage during the sampling process. Initially it was decided to contact a maximum number of respondents, but due to other unavoidable situations in the province, a sample size of $n \geq 30$ was used to select the farmers, extension agents, researchers, marketers, and input dealers for the agricultural innovation system. A total of 205 respondents were randomly selected in the following order, 60 extension agents, 50 researchers, 35 farmers, 30 input dealers, and 30 marketers. Primary data was collected and analysed through a well-structured questionnaire comprising of closed-ended questions based on the objectives of the study and validated by the review of relevant literature.

Frequency counts and percentages were used to describe personal characteristics and knowledge of AIS by the respondents. In addition, mean and standard deviation analysis was chosen to examine the general attitude of respondents towards collaboration.

4. FINDINGS AND DISCUSSIONS

Table 1 indicates that extension agents in the study were predominantly male (65%), with only 35% being female. This might be attributed to socio-cultural factors which favour men. Botlhoko & Oladele (2011:202) confirms that it is still a common belief that male role-players are dominating the agricultural sector when compared to female role-players. Martey, Etwire, Wiredu, & Dogbe (2014:7) point out that female producers usually lack access to agricultural resources that enhance their participation in social activities and innovation. Table 1 also presents the age of respondents, with approximately 50% extension agents, 46% farmers, and 60% marketers being over 50 years of age. Input dealers mostly fell within the range of 41-49 years (40%). This implies that they are in a productive age group, helping to increase food production. However, 56% of the researchers were found to be younger than 40 years of age.

In addition, Table 1 represents the marital status of the respondents. It was found that 64% of researchers and 71% of farmers were married. Afolami, Abayelu, & Vaughan (2015:13) found that being married increases a farmer's concern for household welfare and food security, which is in return likely to have a positive effect on their decision to participate in an agricultural project. The table also shows that 70% of input dealers and 90% of marketers were married. In comparison, only 65% of extension agents were single. Household size is also presented in Table 1, with 52% of extension agents, 58% researchers, 58% farmers, 73% input dealers, and 74% marketers revealing that their household size consists of three to five

persons. This might be due to the increased cost of living resulting in people having fever children.

Table 1: Demographic characteristics of respondents

Variables	**Extension agents**		**Researchers**		**Farmers**		**Input dealers**		**Marketers**	
Gender	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
Male	39	65	34	68	18	51	22	73	21	70
Female	21	35	16	32	17	49	8	27	9	30
Age	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
< 40 Years	16	27	28	56	12	34	10	33	4	13
41–49 Years	14	23	13	26	7	20	12	40	8	27
> 50 years	30	50	9	18	16	46	8	27	18	60
Marital status	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
Single	51	85	15	30	7	20	7	23	1	3
Married	2	3	32	64	25	71	21	70	27	90
Divorced	7	12	3	6	0	0	1	3	1	3
Widowed	0	0	0	0	3	9	1	3	1	3
Household size	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
1-2 members	11	18	14	28	0	0	1	3	4	13
3-5 members	31	52	29	58	20	58	22	73	22	74
> 5 members	18	30	7	14	15	43	7	23	4	13
Highest Educ. Level	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
No formal education	0	0	0	0	11	31	0	0	0	0
Certificate	12	20	0	0	14	40	6	20	27	90
Diploma	18	30	0	0	8	23	16	53	3	10
Degree	24	40	3	6	1	3	7	23	0	0
Honours	5	8	5	10	1	3	1	3	0	0
Masters	1	2	26	52	0	0	0	0	0	0
PhD	0	0	16	32	0	0	0	0	0	0
Studying for higher qualification	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
Yes	29	48	21	42	5	17	9	30	1	3
No	31	52	29	58	30	83	21	70	29	97
Working experience	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
1-5 years	5	8	12	20	6	17	4	13	-	-
6-10 years	15	25	19	38	16	46	13	44	-	-
11-15years	14	23	8	16	3	9	7	23	-	-
16-20 years	4	7	3	6	4	11	3	10	-	-
> 20 years	22	37	8	16	6	17	3	10	-	-

This is contradictory to the findings of previous studies done by Wiredu, Martey, & Etwire (2013:8), who found that household size correlates to a form of increased family labour and complements the efforts of household heads on the farm. Table 1 further presents the

educational level of respondents where 40% of the extension agents have a tertiary degree or qualification, 52% of researchers have a master's degree, 40% of farmers have certificates, 53% of input dealers have a diploma, and 90% of marketers have some form of certification. This high education level shows that respondents are able to make informed decisions. Moreover, Enete & Igbokwe (2009:130) found that education enables people to make independent choices and act on the basis of the decision made. It further increases their tendency to collaborate with others and participate in group activities.

Table 1 further reveals the population distribution of studying to obtain a higher qualification. A high percentage of respondents were found not to be studying towards a higher qualification; with 52% of extension agents and 58% of researchers. This might be because they are already highly qualified However, some of them indicated that their current workload makes it difficult for them to pursue further studies. A large majority of farmers (83%) indicated that it is difficult for them to further their studies due to additional farm work and family responsibilities. Input dealers represented 70%, and marketers 97% of the total statistical analysis. The findings in Table 1 depict that 37% of extension agents have more than 20 years of working experience compared to 38% of researchers and 46% of farmers. This is contrary to Adesoji, Farinde, & Ajayi (2006:309) who found that only 22% of farmers have more than ten years of farming experience. Furthermore, 44% of input dealers were found to have working experience of six to 10 years. However, longer work experience is valuable, because it enables an individual to obtain experience in working environments while demonstrating what their abilities are to contribute to a sector with restrictions.

Table 2 presents knowledge of innovation systems by extension agents, farmers, researchers, input dealers, and marketers identified for agricultural innovation systems in the North West Province. The respondents were asked whether they are aware and knowledgeable about agricultural innovation systems. The results show that extension agents agreed that agricultural research, extension, education, and training are key components of AIS (100%), plays an important role in developing human and social capital as well as in creating jobs (97%). They also believe that agricultural prosperity depends on new innovation because it is the application of knowledge and skills from different resources (87%). These results prove that extension agents are aware and knowledgeable about the agricultural innovation system because they believe in collaboration with different organisations in bringing about change in agriculture.

Farmers displayed their knowledge and understanding of AIS by stating the following, it is a model through which information dissemination needs to be performed by different stakeholders (97%), AIS enables novel and positive experience (97%), it is a network of agents whose interaction determines the innovative impact of knowledge intervention (94%), an agricultural innovation system is built on previous learning process (94%), it is the application of knowledge and skills from different resources (92%), it plays an important role in developing human and social capital (92%), it plays a role in job creation (92%), facilitates farmers access to markets (91%), and education and training are components of AIS (91%).

Table 2: Knowledge of agricultural innovation system by extension agents, farmers, researchers, input dealers, and marketers.

Statements	Extension agents	Farmers	Researchers	Input dealers	Marketers
Agricultural prosperity depends on new innovation.	52(87)	14(40)	33(66)	20(67)	28(93)
Innovation is the application of knowledge and skills from different resources.	52(87)	34(92)	49(98)	28(93)	28(93)
Innovation system plays an important role in developing human and social capital.	58(97)	34(92)	50(100)	28(93)	28(93)
AIS plays a role in job creation.	58(97)	34(92)	47(94)	28(93)	27(90)
AIS play a vital role in generating income and poverty alleviation.	51(85)	31(89)	49(98)	25(96)	27(90)
AIS is a model in which information dissemination needs to be performed by different stakeholders.	51(85)	34(97)	48(96)	28(93)	27(90)
AIS is a network of agents whose interaction determines the innovative impact of knowledge interventions.	45(75)	33(94)	47(94)	23(77)	26(87)
AIS enhances the knowledge and skills of farmers.	53(88)	30(86)	49(98.0)	29(97)	25(83)
Facilitates farmers' access to markets.	53(88)	32(91)	48(96)	29(97)	25(83)
Agricultural research and extension are the key components.	60(100)	26(74)	47(94)	27(90)	25(83)
Farmers are not involved in the decision-making process.	33(55)	23(66)	17(34)	10(33)	28(93)
AIS requires a range of skills.	50(83)	27(77)	45(90)	24(80)	2(7)
Education and training are the components of AIS.	60(100)	32(91)	49(98)	30(100)	29(97)
People innovate in silos.	22(37)	17(49)	22(44)	8(27)	2(7)
Allows actors with different perspectives and interests to have access to the process.	17(28)	21(60)	29(58)	19(63)	29(97)
Actively integrates new participants.	13(22)	21(60)	33(66)	19(63)	28(93)
Roles are clarified.	38(63)	30(86)	48(96)	27(90)	24(80)
Personal relations are established.	24(40)	26(74)	33(66)	18(60)	27(90)
Organise informal, bilateral meetings at the participants' location to get to know each other's life world.	12(20)	20(57)	34(68)	14(47)	28(93)
Show commitment, engagement and sensitivity as facilitator.	53(88)	32(91)	48(96)	28(93)	28(93)
Collaborating on a specific product to achieve concrete goals.	51(85)	27(77)	49(98)	30(100)	27(90)
Organising a situation where distinct actors are addressed as experts.	16(27)	21(60)	30(60)	15(50)	28(93)
AIS is built on previous learning process.	46(77)	33(94)	47(94)	28(93)	28(93)
AIS enables novel and positive experience.	47(78)	34(97)	50(100)	30(100)	27(90)

The results indicate that farmers support collaboration between stakeholders, and that they believe it will be fruitful to their livelihoods when all contributors trust each other and are prepared to work together in the innovation process. Input dealers are aware and knowledgeable about agricultural innovation systems by agreeing to the following statements, that education and training are the components of agricultural innovation systems

(100%), it is built on the previous learning experiences (100%) and enables novel and positive experiences. Input dealers further agreed to collaborate on specific products to be able to achieve a concrete goal (100%). In addition, they further agreed that innovation systems play a vital role in generating income and poverty alleviation (96%), innovation is the application of knowledge and skills from different resources (93%), plays an important role in developing human and social capital as well as in job creation (93%), but requires a range of skills (80%).

This suggests that input dealers believe a holistic, market-oriented approach helps to develop sustainable input supply systems and allows them to accelerate the introduction of technology. Marketers indicated their knowledge of agricultural innovation systems by agreeing to the followings statements, education and training are the components of AIS (97%), agricultural innovation systems allow actors with different perspectives and interests to have access to the process (97%), agricultural prosperity depends on new innovation (93%), innovation is the application of knowledge and skills from different resources (93%), and innovation systems play an important role in developing human and social capital (93%).

Furthermore, Table 3 reflects extension agents, farmers, researchers, input dealers, and marketers' responses to the attitude statements towards collaboration. The results show that farmers rated the following three statements with the highest mean (4.60): colleagues come with their own bias, colleagues have different ideas, not all stakeholders desire to collaborate, and this indicates a negative attitude. The statement which received the lowest mean from almost all respondents was, I do not appreciate working with other people.

Table 3: Attitude of extension agents, farmers, researchers, input dealers, and marketers towards collaboration.

Statement	Extension agents	Farmers	Researchers	Input dealers	Marketers
	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
Colleagues come with own bias	4.17 (.92)	4.60 (.49)	3.82 (.59)	3.67 (1.03)	4.10 (.40)
Colleagues have different ideas	4.0 (1.07)	4.60 (.49)	3.87 (.73)	4.50 (.57)	4.10 (.40)
Not all stakeholders desire to collaborate	4.3 (.71)	4.60 (.49)	4.16 (.62)	4.23 (.94)	4.07 (.45)
There is duplication of efforts	3.68 (.93)	3.91 (.78)	3.32 (.98)	3.40 (1.16)	3.97 (.49)
No complement to each other	4.12 (.64)	3.62 (.84)	3.66 (.85)	3.77 (.97)	3.80 (.76)
Time consuming to get right people	2.95 (.93)	3.80 (.47)	3.06 (1.11)	2.97 (1.19)	5.53 (.77)
Misunderstanding may occur	3.52 (.75)	4.17 (.45)	3.94 (.47)	4.20 (.66)	3.63 (.67)
Other organisations are judged	3.47 (.75)	3.80 (.63)	3.74 (.75)	3.97 (1.03)	3.60 (.62)
Other organisation's views are respected more than others	3.50 (.70)	4.11 (.63)	4.00 (.70)	3.83 (1.05)	3.60 (.77)
Some powerful stakeholders may refuse to participate	4.02 (.65)	4.26 (.56)	3.97 (.60)	4.37 (.96)	3.90 (.76)
Participants have may have more than one view in an issue	4.03 (.64)	4.28 (.57)	4.06 (.47)	4.63 (.67)	3.87 (.73)
Collaboration with other organisations is important	4.33 (.77)	4.14 (.43)	4.40 (.57)	4.40 (.86)	3.80 (.96)
Conflicts are difficult to resolve	3.23 (1.01)	3.86 (.65)	3.40 (1.01)	3.13 (1.17)	3.87 (.78)
All stakeholders may not have the necessary skills	3.76 (1.07)	4.31 (.63)	4.08 (.53)	4.17 (1.34)	3.90 (.71)
No transparency	2.83 (1.06)	3.86 (.55)	3.40 (.99)	3.70 (1.15)	3.93 (.52)
Weakness of other organisations is shown	3.3 (.89)	4.00 (.54)	3.80 (.67)	3.67 (1.30)	3.90 (.48)
Some participants are unwilling to share their knowledge and expertise	3.8 (.78)	4.09 (.70)	3.74 (.83)	4.37 (.99)	3.93 (.64)
Barriers among organisations are broken down	3.10 (.99)	3.11 (.16)	3.50 (.86)	3.40 (1.25)	3.67 (.71)
Not all organisations take collaborative efforts in decision making	3.5 (.98)	4.00 (.80)	3.86 (.83)	3.83 (1.49)	3.87 (.63)
I do not appreciate working with other people	2.72 (1.26)	3.11 (1.21)	2.92 (1.18)	2.50 (1.31)	3.73 (.78)
My organisation prefers working with other organisations	3.73 (1.34)	3.63 (1.06)	4.10 (.81)	3.63 (1.27)	3.77 (.82)
Different institutions have different mandates	3.90 (.88)	2.29 (.51)	4.08 (.70)	4.33 (.66)	3.87 (.73)
Collaboration is not within our scope of work	2.43 (1.18)	3.26 (1.31)	2.48 (1.16)	1.17 (1.40)	3.77 (.73)
Collaboration creates difficulty in setting rules	2.57 (.83)	3.71 (.96)	2.92 (1.08)	3.60 (1.10)	3.73 (.83)
There is lack of order in collaboration	2.65 (.82)	3.57 (.92)	3.06 (.96)	3.53 (1.17)	3.83 (.75)
Collaboration reveals the weakness of other organisations	2.82 (.89)	3.74 (.92)	3.26 (.92)	3.63 (1.13)	3.80 (.66)
Collaboration helps breakdown bureaucratic barriers between organisations	3.00 (.90)	3.78 (.84)	3.78 (.65)	4.17 (.99)	3.73 (.52)
Colleagues are unwilling to share resources with others	4.15 (.94)	4.43 (.81)	3.72 (.81)	4.37 (.96)	3.83 (.59)

5. CONCLUSION AND RECOMMENDATIONS

In the North West Province, farming decisions are made by men rather than women. The results of collaboration have a positive effect on the adoption of agricultural innovation systems. The results of the current study indicate that the respondents showed knowledge of agricultural innovation systems, however, they differed in terms of their attitude towards collaboration. Thus, stakeholders should proactively work together. There is a wide

spectrum of contributors involved in the agricultural innovation system in the North West Province, therefore collaboration needs to be strengthened in order to promote agriculture.

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