

Performance Effectiveness Index of Technology Dissemination System of State Departments of Agriculture in Kerala and Andhra Pradesh

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ABSTRACT

Technology dissemination to the farming community and evaluation of adopted technologies among the farming community are the ultimate goals of Agriculture Departments working at the state level. Considering the utmost importance of the State Departments of Agriculture (SDA) in terms of technology dissemination, a research was carried out to develop the Performance Effectiveness Index (PEI) of the State Departments of Agriculture (SDA) with respect to technology dissemination system in Kerala and Andhra Pradesh. With this objective, a survey was conducted among extension personnel from Kerala and Andhra Pradesh with a total of 200 respondents, comprising 100 respondents from each of the states Kerala and Andhra Pradesh to rate the statements about Performance Effectiveness Index (PEI) of technology dissemination system. The data collected through a structured questionnaire were analysed using the framework devised to measure the Performance Effectiveness Index (PEI) of technology dissemination system. The framework comprises the three indices namely: Human Performance Effectiveness Index (HPEI), Technology Dissemination System Effectiveness Index (TDSEI) and Organisational Effectiveness Index (OEI). The study also depicted the comparative analysis of Performance Effectiveness Index (PEI) among Kerala and Andhra Pradesh states using parametric standard normal deviate test. Results revealed that, nearly half (45%) of the Kerala respondents and more than half (52%) of the Andhra Pradesh respondents perceived that the Performance Effectiveness Index (PEI) of SDA was medium and comparative analysis of PEI among the states showed that, there was significant difference between Kerala and Andhra Pradesh states with respect to technology dissemination systems of SDA. In order to improve the PEI of technology dissemination systems of SDA, the SDA should act on effective management strategies to enhance the individual competencies and refine the technology dissemination methods with the best possible organisational support at the farmer level. The study also suggested that, regular capacity building programmes and timely performance assessment with appropriate tools could upgrade the performance of extension personnel in developing farming communities through best suitable extension services.

Key words : *Extension Personnel, State Department of Agriculture, Technology Dissemination System, Performance Effectiveness Index*

Introduction

Agricultural extension service delivery all over the world has been concerned with communicating research findings and improved agricultural practices to farmers. Agricultural extension service is saddled with the responsibility of disseminating technological innovation that could transform agricultural production to ensure food security and economic development of farming community (Apantaku and Oyegunle, 2016). Technology dissemination of State Departments of Agriculture (SDAs) over the years has been at the fore-front in the delivery of adequate information to farmers for improved productivity. The State Departments of Agriculture (SDAs) has been created mainly to provide agricultural extension services and latest technical knowledge to the farming community with the prime emphasis on introduction of high yielding varieties, laying demonstrations, imparting training to farmers to improve skills and knowledge to boost up the agricultural Production and productivity. In the contemporary scenario, the roles of agriculture departments go beyond the transfer of technology and of farmers' training but include certain other facilitating functions such as assessing requirements of agriculture inputs well in advance, regulating their production, monitor timely supply of seeds, fertilizers and pesticides to farmers, soil testing, soil and water conservation, soil survey, credit assessment, media production, training to farmers, arranging public-private campaigns, diagnostic team visits, monitoring and evaluation, disaster management, crop insurance, agricultural mechanization and extending technical assistance to various agencies (Ijeoma and Adesope, 2015). Performance effectiveness of State Departments of Agriculture (SDA) is essentially a goal-attainment concept. It is concerned with the relationship between goals or objectives, outputs and impacts in relation to its service delivery roles (Palaiologos *et al.*, 2011). Performance effectiveness of SDA with respect to their technology dissemination systems largely depends on the performance of the extension personnel. In any state, extension personnel in the agriculture department are required to have insight into a range of things including weather, soil quality, irrigation, fertilizers, pest attacks and seeds, in addition to maintaining a record of information on various aspects of implementing state and central agricultural schemes (Priya and Narayana, 2013). Similarly, the technology dissemi-

nation system of State Department of Agriculture (SDA) is critical for agricultural growth and food security, but making the dissemination system effective, demand driven and responsive to the needs of a diverse set of farmers remains a challenge for policy makers.

State Departments of Agriculture (SDA) with various technology delivery mechanisms need to respond to significant changes taking place in the economic and institutional environments in which agricultural research operates, and address issues related to persistent poverty, globalization, and the integration of new technologies (Anirban and Aniruddha, 2015). Considering the pivotal role that are playing by Agricultural Departments in the country, assessing and improving the performance effectiveness of extension personnel working in the SDAs in relation to various technology dissemination methods have become priorities in many states. Globally, several studies in agricultural extension contexts focus on evaluating the effectiveness of extension organisations from economical prospective. In the agricultural extension organisations, there is a lack of proper and adequate understanding of the performance of extension personnel. To get a true picture of the system analysis the service delivery of the system along with performance of extension personnel should be analyzed (Sabrosky, 2013). Therefore, an evaluation of performance effectiveness of technology dissemination would provide a better platform for assessing of farmers' predisposition to adopt or not to adopt the technology delivered by the department. With this contextual, a study was conducted with properly devised framework to analyse the Performance Effectiveness Index (PEI) of technology dissemination system of State Departments of Agriculture (SDA) in Kerala and Andhra Pradesh as a comparative analysis for strengthen the rural economy by providing farmers with high-demand services through effective delivery mechanisms in both the states.

Materials and Methods

State Departments of Agriculture (SDA) were selected purposively as an organization for the present study due to the prime role, responsibility and immense importance given to them in providing agricultural services to the farmers at grassroots level. With this background, a survey was conducted using pre tested and structured questionnaire during

2017 among the targeted segments of Kerala and Andhra Pradesh extension personnel with a total of 200 respondents to rate the statements about Performance Effectiveness Index (PEI) of technology dissemination system. Respondents were selected through stratified random sampling where in the Kerala state was classified into 5 zones, from each zone 20 extension personnel were selected randomly with the sample size of 100 respondents. In case of Andhra Pradesh, the state was classified into two regions, namely: Rayalaseema and Coastal Andhra regions, from each region 50 extension personnel were selected randomly with the sample size of 100 respondents. Thus, the total sample size comprises 200 respondents.

Performance Effectiveness is operationalized in this study as the system's ability to achieve the predetermined goals in the appropriate time frame and right quality. Based on the available review of past studies and discussions with subject matter specialists, a framework was developed to measure Performance Effectiveness Index (PEI) of technology dissemination system of State Department of Agriculture (SDA). This framework was devised and measured in three components namely: Human Performance Effectiveness Index (HPEI), Technology Dissemination System Effectiveness Index (TDSEI) and Organisational Effectiveness Index (OEI).

Human Performance Effectiveness Index (HPEI)

It was operationally defined as the individuals' ability in terms of various personal attributes to achieve the predetermined goals in the appropriate time frame and right quality. This component comprises 9 sub-variables each of which was measured in three point continuum, i.e. High, Medium and Low.

i. Communication behaviour and skills

It was operationalised as the individual ability in the expression of feelings, needs and thoughts to another effectively and efficiently.

ii. Human relation

It was operationalised as the individual differences in the treatment of people in a professional context.

iii. Role performance

It was operationalised as the ability of an individual in successful accomplishments of prescribed role.

iv. Work Output

It was operationalised as the amount of energy, work, or services produced by an individual in a period.

v. Personal Attributes

It was operationalised as the character traits or personality traits that an individual possessed towards State Department of Agriculture (SDA).

vi. Functional Competency

It was operationalised as the knowledge, skill and capabilities requisite to fulfill job related works, activities or duties of SDA.

vii. Technical competency

It was operationalised as the knowledge, skill 0020 and capabilities requisite to handle computers, ICT applications and multimedia tools for information dissemination.

viii. Job related aspects

It refers to the knowledge, experience, satisfaction that an individual possessed on his/her job.

ix. Organizational aspects

It refers to the knowledge, experience, satisfaction, duties and responsibilities that an individual possessed in his/her organization.

Respondents were asked to give their self-perceived responses on the above sub-variables. Based on the respondents rating, the HPEI was calculated using the following formula.

$$\text{HPEI} = \frac{\text{Respondent score} - \text{Minimum Possible Score}}{\text{Maximum Possible score} - \text{Minimum Possible Score}} \times 0.35$$

0.35 = Weightage given to the HPEI through judges rating by considering other two components weightage

Technology Dissemination System Effectiveness Index (TDSEI)

It was operationally defined as the technology dissemination system's ability in terms of various attributes to achieve the predetermined goals in the appropriate time frame and right quality. Various technology dissemination systems currently operating in the state were sorted out and attributes of these dissemination systems were categorized into three sub variables which were measured using three point continuums, i.e. High, Medium and Low.

i. Utility and Credibility related

It refers to the extent of useful and credible information provided by the particular technology dissemination system/method to the final end users.

ii. Subject related

It refers to the extent of subject matter covered by

the technology dissemination system/method.

iii. User friendliness related

It refers to the extent of ease in learning, understandability and interaction facilitated by technology dissemination method/system to the final end users.

Respondents were asked to give their self-perceived responses on the above sub-variables in relation to various technology dissemination methods implemented by the SDA during the study. Based on the respondents rating, the TDSEI was calculated using the following formula.

$$\text{TDSEI} = \frac{\text{Respondent score} - \text{Minimum Possible Score}}{\text{Maximum Possible score} - \text{Minimum Possible Score}} \times 0.40$$

0.40 = Weightage given to the TDSEI through judges rating by considering other two components weightage

Organisational Effectiveness Index (OEI)

It was operationally defined as the organization's ability in terms of financial outlay received and spent, number of programmes, demonstrations, field visits, farmer group meetings, exhibitions and farmer training programmes conducted during the given period of time to achieve the organizational goals in the appropriate time frame and right quality. Various details of State Department at Krishibhavan level in Kerala and Agricultural Office level in Andhra Pradesh were collected to assess the organizational effectiveness in a three point continuum i.e. High, Medium and Low. Based on the respondents rating, the OEI was calculated using the following formula.

$$\text{OEI} = \frac{\text{Respondent score} - \text{Minimum Possible Score}}{\text{Maximum Possible score} - \text{Minimum Possible Score}} \times 0.25$$

0.25 = Weightage given to the OEI through judges rating by considering other two components weightage

After calculating the indices of three components, the combined Performance Effectiveness Index (PEI) of three components was calculated for each respondent using the following formula. Based on the total scores, the respondents were classified into 3 categories using quartiles, as measure of check (Table 1).

$$\text{PEI} = [\text{HPEI} + \text{TDSEI} + \text{OEI}] \times 100$$

Test for the significant difference between two sample proportions

Table 1. Categorisation of respondents based on their PEI

Category	Quartile classification
Low	Less than Quartile Deviation ₁
Medium	Between Q ₁ -Q ₃
High	More than Quartile Deviation ₃

The study also depicted the comparative analysis of Performance Effectiveness Index (PEI) among Kerala and Andhra Pradesh states using parametric standard normal deviate test. In this study, p_1 and p_2 are used to represent the Kerala and Andhra Pradesh sample proportions. To test whether the proportion of the sample from Kerala is in agreement with the proportion of the sample from Andhra Pradesh, parametric standard normal deviate test was used. The following test criterion/test statistic was used to test for the significant difference between two sample proportions.

$$H_0: p_1 = p_2 \quad \text{Vs} \quad H_1: p_1 \neq p_2$$

$$\text{Test criterion 'Z'} = \frac{P_1 - P_2}{\sqrt{pq (1/n_1 + 1/n_2)}}$$

Results and Discussion

The completed and returned questionnaires from our sample of respondents revealed the distribution of respondents based on their Performance Effectiveness Index (PEI). The procedure was devised and measured in three components namely: 1. Human Performance Effectiveness Index (HPEI), 2. Technology Dissemination System Effectiveness Index (TDSEI) and 3. Organisational Effectiveness Index (OEI).

Human Performance Effectiveness Index (HPEI)

Distribution of respondents based on their Human Performance Effectiveness Index (HPEI) in the States of Kerala and Andhra Pradesh with respect to different sub variables is shown in the Table 2. Examining the extension personnel distribution, it could be evident from the Table 2 that Human relations, Work output, Personal attributes and Organizational aspects were the sub-variables which were showing the significant difference in their distribution between Kerala and Andhra Pradesh states. Distribution of respondents based on the remaining sub-variables were not showing significant difference between the two states.

Observing the human relations sub variable, the

distribution of extension personnel showed that, majority of the respondents belonged to medium category of human relations in Kerala (59%) and Andhra Pradesh (63%) states, followed by 26 per cent in Kerala and 15 per cent in Andhra Pradesh in the low category and 15 per cent in Kerala and 22 per cent in Andhra Pradesh in the high category of human relations. This might be because the extension personnel believed that success of any agricultural programme is directly proportional to the rapport that an extension personnel maintains with the farming community which is why medium to high human relations in both the states but with significant difference in the proportions where Andhra Pradesh extension personnel proportion was more in medium and high categories than Kerala extension personnel (Table 2).

Witnessing the work output sub variable, the distribution of extension personnel showed that, majority of the respondents work output was medium in Kerala (49%) and Andhra Pradesh (64%) states, followed by 28 per cent in Kerala and 20 per cent in Andhra Pradesh with low work output and 23 per cent in Kerala and 16 per cent in Andhra Pradesh respondents work output was high. The difference

in targeted area of operation between the states might be the reason resulting in Kerala extension personnel's work output to be low compared to Andhra Pradesh extension personnel (Table 2).

In case of the personal attributes sub variable, the distribution of extension personnel showed that, majority of the respondents personal attributes were medium in Kerala (65%) and Andhra Pradesh (57%) states, followed by 20 per cent in Kerala and 22 per cent in Andhra Pradesh respondents with high personal attributes were high and 15 per cent in Kerala and 21 per cent in Andhra Pradesh respondents personal attributes were low. This might be due to the extension personnel psyche on the advanced agricultural technologies, organizational culture and climate that are strongly influencing the work environment and personality attributes of the extension personnel, which is why significant difference in the proportions where Andhra Pradesh extension personnel proportion was less in medium and low categories than Kerala extension personnel (Table 2).

Witnessing the organizational aspects sub variable, the distribution of extension personnel showed that, majority of the respondents perceived that the organizational aspects was medium in Kerala (59%)

Table 2. Distribution of respondents based on HEI with respect to different sub-variables. n=200

Sub-variables	Kerala extension personnel (n ₁ =100)			Andhra Pradesh extension personnel (n ₂ =100)		
	Low (<Q1)	Medium (Q1-Q3)	High (>Q3)	Low (<Q1)	Medium (Q1-Q3)	High (>Q3)
	No./%	No./%	No./%	No./%	No./%	No./%
1. Communication behaviour and skills	20	60	20	18	62	21
2. Human relations	26	59	15	15	63	22
3. Role performance	18	60	22	18	56	26
4. Work output	28	49	23	20	64	16
5. Personal attributes	15	65	20	21	57	22
6. Functional competency	20	62	18	19	66	15
7. Technical Competency	18	57	25	17	57	26
8. Job related aspects	25	56	19	20	58	22
9. Organizational Aspects	19	59	22	27	56	17

Table 3. Distribution of respondents based on HEI with respect to different sub-variables. n=200

Category	Kerala extension personnel (n ₁ =100)		Andhra Pradesh extension personnel (n ₂ =100)	
	No.	%	No.	%
Low (<Quartile ₁)	23	23	20	20
Medium (Q ₁ -Q ₃)	56	56	55	55
High (>Quartile ₃)	21	21	25	25

Data range – 88 to 134 Data range – 96 to 128 Quartile₁-106 Quartile₃ -116 Quartile₁-108 Quartile₃ -118.25

and Andhra Pradesh (56%) states with almost equal proportions, followed by 22 per cent in Kerala and 17 per cent in Andhra Pradesh respondents perceived that the organizational aspects was high and 19 per cent in Kerala and 27 per cent in Andhra Pradesh respondents perceived that the organizational aspects was low. This might be due to the fact that extension personnel in Andhra Pradesh needs to deal with highly diversified farming communities where economic background, literacy rate and size of land holding are highly diversified compared to Kerala farming communities. Thus, the facilities and resources from the organizations, to link with these different categories of farmers are low. Whereas in Kerala, the farmers belonged to more or less similar economic background and literacy rate, which in turn has influenced the perceived organizational aspects by Kerala extension personnel to be higher than that of Andhra Pradesh (Table 2).

Distribution of respondents based on their combined Human Performance Effectiveness Index (HPEI) which was calculated by taking the mean score of the sub variables scores is shown in Table 3. Examining the 'Kerala extension personnel' distribution, it could be evident from the table 3 that more than half of the respondents (56%) HPEI was medium, while 23 per cent and 21 per cent of the respondents HPEI was low and high respectively with almost equal proportions. The probable reason that could be attributed to this might be that, the respondents are receiving regular trainings on the capacity building programmes which in turn developed their effectiveness in technology dissemination methods.

With respect to 'Andhra Pradesh extension personnel' distribution, more than half of the respondents (55%) HPEI was medium, while 25 per cent and 20 per cent of the respondents HPEI was high and low respectively. The reason behind the findings might be that the extension personnel conviction to serve better for the farming community, needs continuous improvement in knowledge and skills. Thus, medium to higher human effectiveness was observed (Table 3).

Comparative analysis of HPEI among Kerala and Andhra Pradesh extension personnel

The parametric standard normal deviate tests were used to test the significant difference of two sample proportion which means whether the proportion of the Kerala sample is in agreement with Andhra Pradesh sample proportion or not with respect to

HPEI (Table 4). From the perusal of Table 4, it could be clearly evident that, 'z' value was less than the table value both at 0.05 and 0.01 per cent level of significance. Hence, it was inferred that there was no significant difference among Kerala and Andhra Pradesh sample proportions with respect to HPEI. The perceived reason behind the findings might be that the knowledge and skills of extension personnel were regularly monitored and updated through various performance appraisal methods and need based trainings are organised in both the states for improved work efficiency.

Table 4. Comparative analysis of HEI among Kerala and Andhra Pradesh states
n=200

Category	Kerala (n ₁ =100)	Andhra Pradesh (n ₂ =100)	'z' value
Low (<96)	38	43	0.7202
High (96 and above)	62	57	
Median Value - 96			

Technology Dissemination Systems Effectiveness Index (TDSEI)

Distribution of Kerala extension personnel based on their TDSEI with respect to different dissemination methods of Kerala SDA

The distribution of Kerala respondents based on their TDSEI with respect to different methods are presented in Table 5. Examining the Kerala extension personnel distribution *vis-a-vis* Kissan Kerala, more than half of the respondents perceived that the effectiveness of Kissan Kerala technology dissemination system was medium followed by high (28%) and low (15%) respectively. With respect to Farm Information Bureau half of the respondents felt that the effectiveness of Farm Information Bureau dissemination system was medium followed by low (27%) and high (23%) respectively. In case of ATMA (Agricultural Technology Management Agency) and LEADS (Lead farmer Extension Advisory Delivery Services) more than half of the respondents (56%) opined that the effectiveness of ATMA and LEADS was medium followed by high (24%) and low (20%) respectively. With respect to Agriculture information Hub nearly half of the respondents (48%) felt that the effectiveness of Agriculture information Hub was medium followed by low (30%) and high (22%) respectively. In case of State universities and ICAR institutes nearly half of the respon-

dents (49%) perceived that the effectiveness of State universities and ICAR institutes was medium followed by low (28%) and high (23%) respectively.

From the perusal of Table 5 further revealed that the overall distribution of the respondents based on combined TDSEI (Aggregate score of all technology dissemination methods), more than half of the respondents (51%) perceived that the technology dissemination systems effectiveness was medium followed by with almost equal proportions low (25%) and high (24%) respectively. The reasons behind the findings might be that Kissan Kerala technology dissemination system is highly comprehensive and holistic interactive one stop destination for receiving the agricultural information when compared to other technology dissemination methods. Hence majority of the respondents perceived that, Kissan Kerala effectiveness was medium to high. Majority of the extension personnel are not fully aware about the Agriculture information Hub and Farm Information Bureau. Hence majority of the respondents perceived that, the effectiveness was low to medium. Overall distribution of respondents based on aggregate score of all technology dissemination methods reveals that, any dissemination method to be effective should cater to the location and problem specific needs. Therefore, the system's effectiveness was low to medium.

Distribution of Andhra Pradesh extension personnel based on their TDSEI with respect to different dissemination methods of Andhra Pradesh SDA.

The distribution of Andhra Pradesh respondents based on their TDSEI with respect to different methods are presented in Table 6. Examining the extension personnel distribution *vis-a-vis* AGRISNET, more than half of the respondents (59%) perceived that the effectiveness of AGRISNET was medium followed by high (24%) and low (17%) respectively. In case of APAGROS, nearly half of the respondents (49%) perceived that the effectiveness of APAGROS was medium followed by high (32%) and low (19%) respectively. With respect to ATMA (Agricultural Technology Management Agency), more than half of the respondents (57%) opined that the effectiveness of ATMA was medium followed by high (23%) and low (20%) respectively. With respect to APMARKFED more than half of the respondents (60%) felt that the effectiveness of APMARKFED was medium followed by high (22%) and low (18%) respectively. In case of State universities and ICAR institutes half of the respondents (50%) perceived that the effectiveness of State universities and ICAR institutes was medium followed by high (27%) and low (23%) respectively.

A critical appraisal of Table 6 further revealed that, the overall distribution of the respondents

Table 5. Distribution of Kerala respondents based on their TDSEI with respect to different methods.

S. No.	Technology dissemination methods	Kerala extension personnel (n ₁ =100)		
		Low (<Q1) No / %	Medium (Q1-Q3) No / %	High (>Q3) No / %
1	Kissan Kerala	15	57	28
2	Farm Information Bureau	27	50	23
3	ATMA and LEADS	20	56	24
4	Agriculture information Hub	30	48	22
5	State universities and ICAR institutes	28	49	23
	Total	25	51	24

Table 6. Distribution of Andhra Pradesh respondents based on their TDSEI with respect to different methods.

S. No.	Technology dissemination methods	Andhra Pradesh extension personnel (n ₂ =100)		
		Low (<Q1) No / %	Medium (Q1-Q3) No / %	High (>Q3) No / %
1	AGRISNET	17	59	24
2	APAGROS	19	49	32
3	ATMA	20	57	23
4	APMARKFED	18	60	22
5	State universities and ICAR institutes	27	50	22
	Total	23	50	27

based on combined technology dissemination systems effectiveness component reveals that exactly half of the respondents (50%) perceived the technology dissemination systems effectiveness to be medium followed by high (27%) and low (23%) respectively. The reasons behind the findings might be that APMARKFED technology dissemination system is highly comprehensive interface for getting the information on commodities market prices, price fluctuations and price trends of any commodity in any given locality, which was why majority of the respondents felt that, APMARKFED was highly effective.

Organizational Effectiveness Index (OEI)

The distribution of respondents based on their OEI in the States of Kerala and Andhra Pradesh are presented in Table 7. Examining the 'Kerala extension personnel' distribution, it could be evident from the Table 7 that more than half (54%) of the respondents felt that the OEI (Krishibhavan's) was medium followed by low (25%) and high (21%) respectively. This might be because, the extension personnel perceived that financial outlay allocated and technical guidance provided to conduct demonstrations, field visits and group discussions was not sufficient. Hence, the proportion of lower category was high than the proportion of higher category.

Witnessing the 'Andhra Pradesh extension personnel' distribution, exactly half of the respondents (50%) perceived that OEI (Agricultural Offices) was medium followed by high (30%) and low (20%) respectively. This might be because, the extension personnel perceived that the support from the depart-

ment to conduct number of programmes, demonstrations, field visits and trainings to the farming community was good (Table 7). This results are in line with the findings of Karimi *et al.* (2011) who reported that, the extension personnel perceived organizational effectiveness was medium.

Comparative analysis of OEI among Kerala and Andhra Pradesh extension personnel

The parametric standard normal deviate tests were used to test the significant difference of two sample proportion which means whether the proportion of the Kerala sample is in agreement with Andhra Pradesh sample proportion or not with respect to OEI (Table 8). From the perusal of Table 8, it could be clearly evident that, 'z' value was more than the table value at 0.05 per cent level of significance. Hence, it was inferred that there was significant difference among Kerala and Andhra Pradesh sample proportions with respect to OEI. The reason behind the findings might be that Andhra extension personnel might have received necessary support from the department at right time to implement agricultural schemes and programmes, whereas Kerala department might not have provided the necessary support as expected by extension personnel, which is why the proportion of Kerala extension personnel in lower category was higher than the Andhra extension personnel.

Performance Effectiveness Index (PEI) of technology dissemination system of State Department of Agriculture

Performance Effectiveness Index (PEI) of technology

Table 7. Distribution of respondents based on their Organizational Effectiveness Index (OEI) n=200

Category	Kerala extension personnel (n ₁ =100)		Andhra Pradesh extension personnel (n ₂ =100)	
	No.	%	No.	%
Low (<Quartile ₁)	25	25	20	20
Medium (Q ₁ -Q ₃)	54	54	50	50
High (>Quartile ₃)	21	21	30	30

Data range – 10 to 30 (KL) Data range – 13 to 31 (AP) Quartile₁-17 Quartile₃ -22 Quartile₁-21.25 Quartile₃ -26

Table 8. Comparative analysis of OEI among Kerala and Andhra Pradesh states. n=200

Category	Kerala (n ₁ =100)	Andhra Pradesh (n ₂ =100)	'z' value
Low (<48)	46	32	2.0296*
High (48 and above)	54	68	

Median value-48 * - Significant at 5% level

dissemination system of State Department of Agriculture was calculated using the three components indexes namely: Human Performance Effectiveness Index (HPEI), Technology Dissemination System Index (TDSI) and Organisational Effectiveness Index (OEI) are presented in Table 9.

Observing the 'Kerala extension personnel' distribution, nearly half of the respondents (45%) perceived that the performance effectiveness index of State Department of Agriculture was medium followed by almost equal proportions high (28%) and low (27%) categories respectively. This might be because, the effectiveness of schemes/programmes and technology dissemination methods developed by Kerala State Department of Agriculture (SDA) might not be compatible with all the social classes of farmers and also might not able to tackle the problems of the different hierarchical farmers (Table 9).

Witnessing the 'Andhra Pradesh extension personnel' distribution, more than half of the respondents (52%) perceived that the performance effectiveness index of State Department of Agriculture was medium followed by equal proportions high (24%) and low (24%) group respectively. This might be because, the extension personnel was the major stakeholder who is responsible for disseminating the latest technologies to the farming community, but the heavy burden on the part of extension personnel leads to reduced efficiency and effectiveness in their performance (Table 9). This results are in line with the findings of Tiraieyari *et al.* (2009) who reported that the extension personnel perceived effectiveness

of technology dissemination methods was medium.

Comparative analysis of PEI among Kerala and Andhra Pradesh extension personnel

The parametric standard normal deviate tests were used to test the significant difference of two sample proportion which means whether the proportion of the Kerala sample is in agreement with Andhra Pradesh sample proportion or not with respect to PEI (Table 10). From the perusal of Table 10, it could be clearly evident that, 'z' value was more than the table value at 0.05 per cent level of significance. Hence, it was inferred that there was significant difference among Kerala and Andhra Pradesh sample proportions with respect to PEI. The reason behind the findings might be that the extension personnel's authority, responsibility, number of clients and exposure to field level problems were highly diversified in both states.

The findings confirm that, majority of the Kerala and Andhra Pradesh extension personnel perceived that, Performance Effectiveness Index (PEI) of SDA with respect to technology dissemination system was medium and comparative analysis of PEI among the states showed that, there was significant difference between Kerala and Andhra Pradesh states with respect to technology dissemination systems of SDA. Hence, there is a high chance of inter-scalability of technologies between the states for collective development of State Departments of Agriculture. Continuous appraisal of the technology dissemination methods and approaches of SDA gives

Table 9. Distribution of respondents based on their Performance Effectiveness Index (PEI) of technology dissemination system of SDA n=200

Category	Kerala extension personnel (n ₁ =100)		Andhra Pradesh extension personnel (n ₂ =100)	
	No.	%	No.	%
Low (<Quartile ₁)	27	27	24	24
Medium (Q ₁ -Q ₃)	45	45	52	52
High (>Quartile ₃)	28	28	24	24

Data range – 44 to 71 (KL) Data range – 51 to 74 (AP) Quartile₁-53.64 Quartile₃ -62.35 Quartile₁-58.79 Quartile₃ -65.20

Table 10. Comparative analysis of Performance Effectiveness Index (PEI) among Kerala and Andhra Pradesh states. n=200

Category	Kerala (n ₁ =100)	Andhra Pradesh (n ₂ =100)	'z' value
Low (<300)	40	25	2.2645*
High (300 and above)	60	75	

Median value-300

* - Significant at 5% level

the raw feedback to the departments to improve their holistic development in serving the farming clientele. Systematic restructuring or reforming the technology dissemination systems of State Department of Agriculture (SDA) with improved extension personnel performance could address the farmer's technological requirements in a more effective way.

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