

Farm Mechanization and its Behavioral Effects on Displaced Rice Workers of Region III



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Abstract: With the current development in technology, agriculture has rapidly changed and accepting change and technology is key to mechanical progress. The use of technology has improved efficiency in producing, processing and distributing agricultural produce. Farmers are now gradually shifting to new and modern farming system. Historically, advances in farm mechanization have been made where a strong demand for labor in other industries has withdrawn workers from the land and forced wage rates up. Increasing use of farm machines requires less and less of human power, while, it is expected that mechanized farming leads to more productivity, the reverse is true to displaced farm workers. This research focused on discovering the impact of farm mechanization in the marketing of rice in Central Luzon, Philippines and its behavioural effects on rice workers who were displaced as a result of the use of farm machines.

Keywords: farm mechanization, behavioural effects, modern farming system

I. INTRODUCTION

With current developments in technology, agriculture has rapidly changed; and accepting change and technology is key to mechanical progress. The use of technology has improved efficiency in producing, processing and distributing agricultural produce

Farmers are now gradually shifting to new and modern farming system. Historically, advances in farm mechanization have been made where a strong demand for labor in other industries has withdrawn workers from the land and forced wage rates up.

Increasing use of farm machines requires less and less of human power. While it is expected that mechanized farming leads to more productivity, the reverse is true to displaced farm workers.

II. OBJECTIVES

1. determine socio-economic, and behavioral characteristics of displaced farm workers as a result of farm mechanization; and
- a. describe displaced farmers in terms of socio-economic and demographic profile;
- b. analyze their insights on farm mechanization;
- c. determine new livelihood opportunities after farming and describe their insights;

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IV. RESULTS AND DISCUSSION

A. Socio-economic and demographic characteristics of displaced workers

A total of 157 farmer-respondents were interviewed, across all towns of the four provinces included in the survey. They composed of 76 displaced male farmers and 81 displaced women farmers (Table 1).

Table 1. Farmer-respondents according to gender

Gender	Number Reporting				Total	Percent
	Nueva Ecija	Bulacan	Tarlac	Pampanga		
Male	40	1	15	20	76	48.41
Female	24	10	19	28	81	51.59
TOTAL	64	11	33	48	157	100.0

B. Age distribution of respondents

Nueva Ecija, having the largest area in terms of rice production registered the biggest number of displaced workers at 64, compared with the rest of the rice producing provinces. Based on survey data, these displaced workers were mostly aged 51 years and above, proving that they had farmed through their working lives. Bulacan registered the least number of displaced workers, owing to the few farmers who used farm machines during the time of survey. The average age registered the youngest at 46.5 years in Pampanga and the oldest at 50.81 years in Bulacan (Table 1a).

Table 1a. Distribution of displaced workers according to age

Age Range (years)	Number Reporting				Total	Percent
	Nueva Ecija	Bulacan	Tarlac	Pampanga		
Below 20						
21 – 40	15		10	16	41	26.11
41 – 50	23	6	9	17	55	35.03
51 – above	26	5	15	15	61	38.86
TOTAL	64	11	34	48	157	100.0

Average: 48.18 50.81 48.94 46.5

Range: 24-74 43-60 33-61 24-72

C. Civil status

Majority (81.53%) of the respondents turned out to be married (Table 2). Based on survey data, a majority (66.88%) had also stayed in their residence for more than 36 years, a manifestation that they did not have any other activity aside from rice farming (Table 3).

Table 2. Distribution of displaced workers according to civil status

Civil Status	Number Reporting				Total	Percent
	Nueva Ecija	Bulacan	Tarla c	Pampang a		
Single	6		5	4	15	9.56
Married	55	11	25	37	128	81.53
Widow/Widower	3		4	7	14	8.91
TOTAL	64	11	34	48	157	100.0

Table 3. Distribution of workers according to length of stay in residence

Years in Residence	Number Reporting				Total	Percent
	N. Ecija	Bulacan	Tarlac	Pampanga		
1 – 5			8	1	9	5.74
6 - 10	2		1	2	5	3.18
11 – 15	2	2	1	1	6	3.82
16- 20	0			1	1	0.63
21 – 35	16	2	5	8	31	19.74
36 and above	44	7	19	35	105	66.88
TOTAL	64	11	34	48		100.0

Average: 41.95 33.18 42.10 40.09

Range: 7-74 8-55 2-61 3-62

D. Educational attainment of displaced workers

Financial difficulty prevented these farm workers to pursue higher levels of education. Despite this however, a few managed to finish college education but most of them graduated either from elementary (33.12%) or high school (42.04%) (Table 4).

Table 4. Educational attainment of displaced workers

Educational Attainment	Number Reporting				Total	Percent
	N. Ecija	Bulacan	Tarlac	Pampanga		
Elem. undergrad	4	1	4	4	13	8.28
Elem graduate	22	6	11	13	52	33.12
HS undergrad	2		6	9	17	10.83
HS graduate	33	2	11	20	66	42.04
College undergrad	1			1	2	1.27
College graduate	0	1		0	2	1.27
Vocational	2	1	1	1	5	3.19
TOTAL	64	11	34	48	157	100.0

E. Family size

Majority (61.15%) of the respondents had four children in the family. Realizing the difficulty of having a bigger family, the workers managed to limit their children to four only (Table 5).

Table 5. Family size/number of children of displaced workers

Number of Children	Number Reporting				Total	Percent
	N. Ecija	Bulacan	Tarlac	Pampanga		
0	7		8	8	23	14.65
1 – 4	45	5	15	31	96	61.15
5 - 8	9	3	11	8	31	19.74
9 – 13	3	3		1	7	4.46
TOTAL	64	11	34	48	157	100.0

F. Farming experience

Their farming experience showed that the displaced workers had only farm work as their means of livelihood, as shown by the varied number of years that they had spent in the farm (Table 6).

They started working in the farm even at a young age, that limited their activities only to farm work. Whatever skills they learned, were all related to farm activities. They had spent an average of 20 to 23 years working in the farm.



Table 6. Farming experience of respondents

Range (years)	Number Reporting				Total	Percent
	N Ecija	Bulacan	Tarlac	Pampanga		
5 – 10	11	3	4	13	31	19.74
11 – 15	11	1	10	6	28	17.84
16 – 20	8	2	4	9	23	14.65
21 – 25	5	1	7	3	16	10.19
26 -30	10	3	3	7	23	14.65
31 and above	19	1	6	10	36	22.93
TOTAL	64	11	34	48	157	100.0

Average: 22.48 21 23.26 20.17

Range: 5-56 7-40 10-60 1-52

G. Farm work

Farm work is varied and this included planting, threshing, harvesting palay, driving tractors, and even managing other farm workers. Most of the workers did planting and threshing (Table 7).

Farm work also included weeding, harvesting left overs, fixing hedges, preparing the land; fertilization, cleaning/clearing the area. Others invited farm workers from neighboring towns, and manage them. There were times when there is shortage of workers during harvest season, hence in some occasions, farm owners from Nueva Ecija look for farm workers in nearby towns of Baliuag, Bulacan and Candaba, Pampanga.

Table 7. Distribution of displaced workers based on farm work

Type of work	Number Reporting				Total	Percent
	N Ecija	Bulaca n	Tarla c	Pampang a		
Planting	9	9	18	20	56	35.67
Threshing	7		4	4	15	9.56
Plant and thresh	33	1	12	18	64	40.76
All farm work	11				11	7.0
Drive tractor	1				1	0.64
Invite/manage other farm workers	3	1			4	2.55
Pick up and dry palay				2	2	1.27
Harvest palay				4	4	2.55
TOTAL	64	11	34	48	157	100.0

H. Farm skills learned

Activities done in the farm developed the workers' skills. These help improve their work habits and change their attitudes and used to develop their interpersonal skills and even solve problems and make decisions. Displaced rice workers had acquired the necessary skills through their diligence and perseverance.

Farm workers' skills are all related to planting and harvesting palay. They did all farm work from land preparation , seedling preparation, fertilization, threshing, weeding, transplanting to harvesting, which they had been doing excellently (Table 8). All around farm work also includes land clearing, cleaning and drying palay.

In Bulacan, few displaced workers were interviewed. Farm workers decided to work in the industrial sector in search of higher compensation. The industrial sector growth

of Malolos gave opportunities for displaced women farm workers to work in factories and other industries that gave them higher income and more stable jobs.

In San Rafael, previous male farm workers chose to work in construction sites giving them much higher income.

In Calumpit, The LGU has also provided farm workers free livelihood trainings and seminars, and encouraged them to form themselves into an association, so they can serve as farm service provider.

Table 8. Farm skills learned by displaced workers

Skills	Number Reporting				Total	Percent
	N Ecija	Bulaca n	Tarla c	Pampang a		
Land Preparation	1				1	2
Transplanting	24	6	27	28	85	54.15
Seedling preparation	1				1	0.64
Proper fertilization	2			1	3	1.91
Harvesting	1				1	0.64
Threshing	6		3	6	15	9.55
Weeding	5	2	3		16	10.19
Use hand tractor	10	2			12	7.64
All around farm work	14	1			7	21
None					1	0.64
TOTAL	64	11	34	48	157	100.0

I. Use of farm machines

The use of farm machines elicited mixed reactions and response from the displaced workers. Some of them reasoned out that they were pleased with the use of machines because these facilitated their farm work. These workers were given the chance to be taught by their farm owners the proper way of using the machines. Others, however found the use of machines stressful, since they did not have the proper training to operate them. The rest reasoned out that they were not pleased because the use of farm machines led to their loss of work and source of income. The rest had become indifferent and gave no response (Table 9).

Table 9. Displaced workers' reasons why they are not pleased with use of machines

Reasons	Number Reporting				Total	Percent
	N Ecija	Bulacan	Tarla c	Pampanga		
Lost income and work	33				33	21.02
Stressed/not happy	21				21	42
Pleased, Facilitated farm work	10	11			27	48
No response				34		34
TOTAL	64	11	34	48	157	100.0

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When asked about changes that happened to them as a result of using farm machines, the displaced workers reported that they lost their work and income; and even lost their working days. Others had to change their work as a result of the use of machines (Table 10). While a majority reasoned out that they lost their income and their days of work; the rest missed the opportunity of threshing again, a skill that they had learned as farm workers (Table 11).

Table 10. Changes that happened in the workers' lives resulting from use of farm machines

Changes	Number Reporting				Total	Percent
	N Ecija	Bulacan	Tarlac	Pampanga		
Lost work and income	52	8	6	2	68	43.31
Had to change work	2				2	1.27
Lost source of income	2		24	32	58	36.94
Work no longer regular	8				8	5.10
Lost Working days		3		14	17	10.80
No changes			4		4	2.58
TOTAL	64	11	34	48	157	100.0

Table 11. What were lost after using machines

Response	Number Reporting				Total	Percent
	N Ecija	Bulacan	Tarlac	Pampanga		
Cant thresh anymore	2				2	1.27
Lost income	44	8	28	39	115	73.25
Lost days of work	22	3		6	40	25.48
TOTAL	64	11	34	48	157	100.0

J. New means of livelihood

After losing their works in the farm, the respondents had to look for other means of livelihood, to support their families. They had become resourceful and responsible to look for other means of livelihood. Some of them decided to work in construction sites; planted other crops, and even learned to operate machines. Women farmers decided to perform laundry service to others, went into dressmaking and vending. The rest decided to look for other means of livelihood just to have sources of income for their families. (Table 12).

Table 12. Displaced workers' new means of livelihood

New means of Livelihood	Number Reporting				Total	Percent
	N Ecija	Bulaca n	Tarla c	Pampang a		
Planting	22			2	24	15.28
Personal collector	2				2	1.27
Barangay staff	1		1	2	4	2.55
Variety store	4		3	3	10	6.37
Laundry service	4	1	3	4	12	7.64
Dressmaking	1	5			6	3.82

vendor	1			5	6	3.82	
Vegetable farming	3			1	4	2.55	
Managing farm workers (kabesilya)	1	1			2	1.27	
Fishing	1				1	0.64	
Thresher operator	1				1	0.64	
Junkshop operator	2				2	1.27	
Tricycle driver	5			2	4	11	7.0
Food/Fish vendor	1			4		5	3.18
Electrician	1				1		0.64
Construction worker	3			8	5	16	10.19
Reaper operator	1				1		0.64
No work	10	1		8	7	26	16.56
Livestock farming			3	1	1	5	3.18
driver					1	2	1.27
Govt employee					1		0.64
Hardware store					1	2	1.91
Factory worker					2	2	1.27
Pedicure/manicure					1	1	0.64
Street sweeper					2	2	1.27
Supermarket worker					2	2	1.27
Welding					2	1	0.64
Picking up left over palay					1	1	0.84
TOTAL	64	11	34	48	157	100.0	

K. Sponsors of new jobs

A great majority (87.90 %) did not receive any assistance from sponsors (Table 13). Realizing that they have no one to turn to, they resorted to seek help and support from co farmers and friends in seeking new means of livelihood. In Nueva Ecija, displaced workers turned to bed making, and with the new skills acquired, they earned income through bed making and selling to nearby towns. Some of them managed other farm workers which they termed as "kabesilya". In Bulacan, the displaced women farmers ventured into dressmaking, livestock farming, and doing laundry service . In Tarlac, the displaced farmers went into construction works, tended variety stores and women provided laundry service to others. A few went into livestock farming, driving, and worked in a hardware store. In Pampanga, The workers also turned to construction work, vending, laundry service and other jobs that they found that gave them income.

Meanwhile, as disclosed by the MAO in Bustos , Bulacan, the local government unit (LGU) helped displaced workers by forging a memorandum of agreement (MOA) with factory owners in the area. The factory owners gave priority jobs to displaced workers. Some of them also work as farm machines operator. This made them happy and satisfied after finding new jobs and made this as their reason not to go back to farming anymore.

Table 13. Sponsors of new means of livelihood

Sponsor	Number Reporting				Total	Percent
	N Ecija	Bulac an	Tarlac	Pampanga		
Brgy captain/LGU	1		1	4	6	3.82
None	63	3	33	39	138	87.90
DA		5			5	3.18
4Ps		1			1	0.64
Private persons		2		5	7	4.46
TOTAL	64	11	34	48	157	100.0

L. New skills learned

Among those interviewed, majority (65.7%) responded that they did not learn any new skills, a manifestation that they did not find any alternative work. Others however, reported that they learned new planting skills, fund sourcing skills, vending, dressmaking, machine operation, junkshop operation, and other business skills (Table 14). This finding shows the versatility and responsibility of these displaced workers because they were willing to work even on new jobs.

Table 14. Displaced workers' new skills learned and support from new work

New Skills Learned	Number Reporting				Total	Percent
	N Ecija	Bulaca n	Tarla c	Pampanga		
Harvesting/threshing	3				3	1.91
Budgeting	1		1	1	3	1.91
Do correct laundry	2				2	1.27
Learned dressmaking	2	3			5	3.18
Learned brgy office work	1				1	0.64
Vending	1				1	0.64
Plant	11				11	7.06
Farm work	6	1	1		8	5.09
Reaper operation	1	2			3	1.91
Thresher operation	1				1	0.64
Plant vegetables	3				3	1.91
Junkshop operation	1				1	0.64
none	17	2	32	38	89	65.7
No response	14	2			16	10.19
Fund sourcing		1			1	0.64
Livestock care				1	1	0.64
Handle business			2	2	1.27	
Welding skills			2	2	1.27	
Food processing			2	2	1.27	
Patience and discipline			2	2	1.27	
TOTAL	64	11	34	48	157	100.0

M. Reasons why they are happy with new work

Displaced workers were found to be happy with their new work because they found a new source of income, that provided great help for their families (Table 15). Others found co-workers who treated them well; while others took advantage of the opportunity to go to other places.

On the other hand, other workers were not happy with their new work since, to them these jobs are not permanent. They were indifferent with their new jobs because they found these jobs quite difficult. These workers are those who worked in the farms

the longest, because to them, farming is considered much better since this gives them more income.

Table 15. Reasons why displaced workers are happy with new work

Reasons	Number Reporting				Total	Percent
	N Ecija	Bulacan	Tarlac	Pampanga		
Found source of income	33	9	16	29	87	55.41
Just happy	10		1	1	12	7.64
Great help for family	4				4	2.55
Happy but not contented with new work	1				1	0.64
Not happy	7		16		23	14.65
Found new job difficult	1				1	0.64
Not happy, New job not permanent	1				1	0.64
Not happy, Farming gives more income	1				12	8.28
No response	6	2	1	4	13	8.28
Co workers treat them well					1	0.64
Gives chance to travel to new places					1	0.64
TOTAL	64	11	34	48	157	100.0

N. Reasons for returning to farm work

Majority of the farm workers were eager to return to farm work; since the only skill they have learned well is farming. To them, farming gives reasonable income. They also reasoned out that they prefer farming over other jobs, since this is the first skill they learned. Due to their limited knowledge, these displaced workers were just eager to return to their farm work (Table 16).

However, there were those who were reluctant to go back to the farm due to their old age, hence they prefer to look for other jobs aside from farming.

Table 16. Reasons respondents will return to farm work

Reasons	Number Reporting				Total	Percent
	N Ecija	Bulacan	Tarlac	Pampanga		
Knows only farming	20		2	9	31	19.75
Farming gives reasonable income	24	11	27	25	87	55.41
Farming is the first job learned	3			1	4	2.55
Prefer farming over other jobs	1			1	2	1.27
Cant farm anymore due to old age	2		1	1	4	2.55
Cant farm anymore, so look for other jobs	3		4	1	8	5.09
No response	11				21	13.38
TOTAL	64	11	34	48	157	100.0

O. Children in farm work

A great majority (77.71%) of the displaced workers wanted their children to do farming with the use of machines (Table 17). It is expected that they want to pass on to their children farm skills that they learned, however, others did not want their children to go back to the farm, while others gave no response and just depended on their children's future.

Table 17. Respondents who want their children to be farmers using machines

Reasons	Number Reporting				Total	Percent
	N Ecija	Bulacan	Tarlac	Pampanga		
Yes	38	9	31	44	122	77.71
No	17	2	3	3	25	15.93
Depends on child's future	1			1	2	1.27
No response	8				8	5.09
TOTAL	64	11	34	48	157	100.0

P. Issues and concerns on mechanized farming

When asked about their views and opinions about mechanized farming, the respondents felt the lack of training as the main concern (Table 18). They need to know machine operation and they needed the money to acquire the machines. It is also important for them to determine the terms of reference between the farm owners and the workers for the use of the machines. They also realized the importance of farm associations since they were aware that the government gives priority assistance to farmers' associations than to individual farmers. Others did not mention any concern because they felt they were already old to go back to farming.

Table 18. Displaced workers' issues and concerns related to mechanized farming

Issues	Number Reporting				Total	Rank
	N Ecija	Bulacan	Tarlac	Pampanga		
Lack of training	4	7	20	17	48	1
Lack of knowledge on machine operation	38			3	41	2
No money to buy machinery	3	2	7	7	19	3
TOR is necessary between farm owner and workers	7				7	4
Form associations to avail of machinery from government	2				2	5
No concerns	10	2	7		19	
TOTAL	64	11	34	48	157	

Q. Support from government

Asked for support that they want from government, displaced workers said financial assistance is their main priority (Table 19). This was followed by trainings that they need for livestock production, farm machine operation, meat processing and handicrafts making. Others needed the necessary capital for putting up a variety store; and support for seed and fertilizer subsidy. Others had been indifferent that they did not respond.

Table 19. Displaced workers' livelihood program or assistance from government

Issues	Number Reporting				Total	Rank
	N Ecija	Bulacan	Tarlac	Pampa ngna		
Capital for Sari sari store	5			8	22	3
Training on Welding	4				4	8
Training on Meat processing	2				4	8
Livestock Prod'n Training	10	2	8	8	28	2
Training on Mushroom production	1				1	9
Training on Thresher operation	1				1	9
Training on Combine harvester operation	6				6	6
Financial assistance	2	3	12	18	35	1
Seeds and fertilizer subsidy	3				3	
No response	10				10	4
Motorcycle		1		1	2	
Hand tractor		5			5	7
Farm machineries			2	6	8	5
Training on Machinery operation				3	6	6
Handicraft				1	1	9
No response	64	11	34	48	157	

V. SUMMARY

Displaced rice workers composed of 76 males and 81 females who were middle aged (51 years and above), married (81.53%) and raised at most four children in the family. They were graduates of elementary (33.12%) and high school(42.04%) only. They started farming at a young age and they experienced more than 20 years of rice farming in the farms they worked in. Their skills were limited to farming only as they did not have any other activity except those associated with rice farming.

The use of farm machines was useful to some but not to other workers. Those who found farm machines useful were those trained by farm owners, while those who found the machines stressful and difficult did not benefit from any training.

With the use of machines, they lost their source of income, their job, and their working days. Others were reluctant to return to farm because of their old age.

After being displaced by farm machines, the rice workers learned to be resourceful and responsible since they exercised efforts to look for other jobs when they were displaced by the use of farm machines.

Those from Nueva Ecija went to other towns to plant and others became skilled in handicrafts. In Bulacan, there were only a few displaced workers because after being displaced by farm machines, most of them became construction and factory workers. These displaced workers were assisted by their local government unit to look for jobs from factories in the area.

Those from Tarlac and Pampanga tended variety stores, went into livestock production, vending, dressmaking, machine operation and some other jobs that they can handle. Through diligence and perseverance, the displaced farmers were able to learn new skills, hence found their new source of income to support their families. These skills made them happy with their new work.

However, majority (55.41%) of them wanted to return to farm work, because farming gives them reasonable income. They even wanted their children to return to farm work with the use of machines, and share with them the skills that they themselves learned from the farm.

The assistance they wanted from government is machine operation training. This finding supports the claim that farm mechanization in the Philippines is fast gaining ground but there is a need to strengthen the human resource capacities to ensure that investments in farm machines are maximised.

The displaced workers also expect financial assistance from government for putting up variety stores. They also wanted seminars and trainings pertaining to livestock and handicrafts production.

These displaced rice workers had become versatile in the kind of jobs that they handle. They had also become responsible and had to take any job just so they can earn income for their families.

VI. CONCLUSIONS

Farm mechanization made farm jobs easier and quicker, farm owners had incurred less labor costs and became more productive, leaving behind displaced farm workers with no jobs at all. Nonetheless, displaced farm workers were responsible and resourceful to have found new jobs after displacement.

They went into various jobs, such as construction work; while the women farmers took to factory work, handicraft making and vending just so to earn income for their families.

Displacement caused them to lose their jobs but they had been resourceful enough to look for alternative jobs.

The results had shown the resiliency of the Filipino farmer in terms of resourcefulness and responsibility in looking for means of livelihood for his family.

VII. RECOMMENDATIONS

- Higher institutions of learning must collaborate with the local government units in order to sponsor training

programs pertaining to machine operation. They can also collaborate with machine suppliers for the specifications of machines that farmers can use.

- Lending institutions in the area can also provide assistance for the farmers by providing financial loans.

- The Local Government Units, through the MAO may also come up with policies that assist the farmers into forming themselves into associations, that would give them opportunities to become service providers .

- Higher institutions of learning may coordinate with Philmech, Philrice, and TESDA for trainings and seminars through their extension programs for the farmers to capacitate themselves on machine repairs and maintenance and familiarize them with available service centers to enable the creation of more service centers.

- Since this research focused on the effects of mechanization on the behaviour of displaced workers, there is also a need to look into technology based researches to meet the requirements for policy recommendations.

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AUTHORS' PROFILE



EMELITA C. KEMPIS finished her degree in Agricultural Economics in 1977 as well as her Master's degree in 1987 from the University of the Philippines. Furthermore, she obtained her doctorate degree in Management from Adamson University in 1995 where she was awarded as Meritissimus. At present, she is the Vice- President for Research, Extension and Training of Pampanga State Agricultural University, Philippines since 1995.

In addition to her accomplishments, she is also a constant lecturer and resource speaker in several seminars which are mostly focused on trainings and extension programs like Trainers' Training on Farming Systems Development for APTs in support to CARP, Training on Rice Production for Members of Tarlac Agri-Industrial Development Foundation to name a few.

Moreover, her participation in different research colloquia are commendable. She presented some of her researches like Agricultural Marketing, Socio-Economics of Sheep production in Region III, Farm Plans and many others.

Her expertise was even honed when she was assigned as OIC- President in 1999. But before that, she started her career as a department chair of Agricultural Business and Economics in 1987-1993 which was then followed by her designation as Dean of the Graduate School from 1993-1995. As part of her four-fold function, she was also involved in the AACUP Accreditation committee from 2008-2014. To top her achievements, she received the following awards: Mentor of the Year 1982, Researcher of the Year 1990, PSAU Service Award 2017, Outstanding Alumni, UP Rural High School 2004.