

RESEARCH ARTICLE

Analyzing the Socio-Economic Impact of the TNAU Certificate Course on Coconut Growers in Tamil Nadu

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ABSTRACT

Distance education offers an efficient, convenient, and cost-effective alternative for those beyond traditional education. Yet, effective distant learning in agriculture requires a practical, field-oriented approach. To assess the impact of Tamil Nadu Agricultural University's (TNAU) certified Open and Distance Learning (ODL) course on the socio-economic status of coconut growers, a unique study was conducted. Focusing on distance learners in certificate programs, the research centered on Coconut Cultivation Technology, the most-enrolled course. Employing an ex-post research design, the sample included students completing the course from 2019-21, selected through proportionate random sampling. Information was collected via well-planned interviews, conducted personally and telephonically. The ODL certificate course had significant economic benefits for distance learners, leading to heightened productivity in coconut cultivation. Both gross and net incomes saw substantial growth, accompanied by an expansion in the cultivation area before and after course completion. Learners demonstrated increased investment in health and education. Notably, they acquired new cultivation and value-added equipment, began producing essential input materials on their farms for coconut cultivation, and a few initiated new income-generating ventures. In terms of social impact, one-third of the learners initiated the production of value-added items post-ODL certificate program completion. A significant proportion, approximately three-quarters and more than one-third, reported consistent access to extension and advisory services, along with enhanced accessibility to government policies and programs. They asserted that their impact and knowledge-sharing had heightened awareness, knowledge, and adoption among fellow coconut growers. Following the ODL certificate course, over half of the learners embraced eco-friendly or commendable agricultural practices.

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INTRODUCTION

Distance education is the process of instructing a sizable, scattered, and remote population with limited face-to-face interaction between the teacher and the

learners. It is distinguished by the lack of stringent entry requirements, the ability to learn at one's own pace and convenience, freedom in choosing courses,

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and the application of contemporary and suitable educational and communication techniques (Bhagwat and Rajguru, 2018). In the realm of education, Open and Distance Learning (ODL) is still a relatively new concept. This phrase combines the phrases open learning and distance education. Distance learning is an approach in education, while open learning is a philosophy. ODL's fundamental philosophies are openness and learner-centricity. The success of ODL is primarily attributed to its openness and flexibility in terms of entry and admission requirements, curriculum structure, and flexible learner support. (Hansra and Jain, 2012). For the growing learning society in general and the educationally underdeveloped or developing society in particular, this non-formal method of education has a wide application. It includes a message for integrating schooling as well as for lifelong learning. It serves as an excellent tool for advancing both diverse and vocational education. For those who had left it at various points, it serves as a source of motivation (Ghosh, 2012).

Distance education in India has a robust historical basis and is experiencing rapid growth owing to increasing societal demand. Notably, the introduction of agricultural education through distance learning marks a significant achievement in the realm of agricultural extension (Arslan and Yilmaz, 2022). Unlike traditional theoretical learning, agricultural education emphasizes practical skills. Individuals pursuing agricultural education through distance mode constitute a diverse group, varying in attributes and motivations. Consequently, it is imperative to consistently assess the quality and impact of this education to uphold the standards of the offered courses. In this scenario, within the array of courses available at the Directorate of Open and Distance Learning (DODL) at Tamil Nadu Agricultural University (TNAU), the certificate course focusing on coconut cultivation technology is designed to equip learners with proficiency in diverse aspects of coconut cultivation. The objective is to enhance productivity and yield in coconut farming, empowering individuals to establish their own ventures and thereby elevate their socioeconomic standing (Krishnaveni et al., 2020). Given this context, a research inquiry has been conducted to evaluate the socio-economic impact resulting from the Open and Distance Learning (ODL) Certified Course on Coconut Cultivation Technologies.

MATERIALS AND METHODS

The selection of the Directorate of Open and Distance Learning at Tamil Nadu Agricultural University for this study was deliberate, as it offers a diverse range of certificate programs through the Open and Distance Learning (ODL) mode. Specifically, the course with the highest enrolment, Coconut Cultivation Technology, a six-month duration course that provides the farming community with the most recent advancements in agricultural technologies under coconut cultivation, was purposefully chosen for the research investigation. The study employed an ex-post research design, focusing on students who completed the certificate course on Coconut Cultivation Technology during 2019-21. The sample comprised 130 students selected through the proportionate random sampling method from the total of 234 students who studied during the specified period. Information was gathered from these selected students through well-planned interview schedules conducted both in-person and via telephone. The collected data underwent processing using Descriptive statistics, Cumulative frequency, and paired t-test, utilizing the Statistical Packages of Social Sciences (SPSS) software.

The paired t-test is often used when measurements are taken from the same subject before and after yield and net income comparisons, regardless of whether there is a significant correlation between the yield and net income. The general formula for the paired t-test is as follows.

$$t = \frac{\sum d}{\sqrt{[n(\sum d^2) - (\sum d)^2] / (n-1)}}$$

The sum of differences, or sum of d, is at the top of the formula.

The bottom of the formula is as follows:

The square root of the following: The total of the differences squared less than the sum of the squared differences, multiplied by n times, over n-1.

RESULTS AND DISCUSSION

Socio-economic impact among learners due to the ODL-certified course on coconut cultivation technologies

Impact is the outcome resulting from an action or event, synonymous with "effect" in cause-and-effect contexts. In the study of Open and Distance Learning (ODL) learners, an attempt was undertaken to gauge

the potential influence of the certificate program in coconut cultivation technology on the learners' social and economic standing. The ensuing conclusions pertain to the impact of the certificate course on factors such as farm yield, net income, family expenditure, farm development, and the social status of the learners.

Economic impact

Farm Yield

Table 1 illustrates that the learners' yield increased after completing the ODL certificate course compared to their yield before enrolling in the course. It can be inferred that the average coconut production per tree per year for learners before attending the course was 89 nuts, whereas after attending the ODL certificate course, the average production increased to 102 nuts/tree/year. Also, the average productivity attained by learners before attending the ODL course was 7475 nuts/acre/year, whereas after attending the ODL certificate course, the learners attained an average productivity of about 8349 nuts/acre/year.

The data on the yield attained by learners before and after attending the ODL course were subjected to a paired t-test. The results showed a significant difference in coconut production and productivity (t values of 11.668 and 10.878, respectively) at the 1% level (p value = 0.000). So, it can be concluded

that the learners' coconut production and productivity increased after attending the ODL certificate course on coconut cultivation technology. The study's results were in line with the findings made by Ayil and Undiandeye (2022).

The increase in production and productivity of learners after attending the course might be due to the expansion of the area under coconut cultivation, the adoption of improved farm practices in crop production, and the crop protection aspects learnt in the certificate course.

Income

Table 2 shows that the average gross income of learners before attending the course was Rs. 6,34,745 per year, whereas it increased after undergoing the ODL certificate course with an average of Rs. 7,14,160 per year. Table 2 also indicates that the average net income of learners before attending the ODL certificate course was Rs. 4,22,603 per year. The average net income of learners after undergoing the ODL course was Rs. 5,19,858.

The data on the income of learners before and after attending the ODL course were subjected to a paired t-test. The results showed a significant difference in gross income (t value = 9.842) and net income (t value = 12.286) at a 1% level, with p values of 0.000. Thus, it can be concluded that both gross income and

Table 1. Yield range before and after attending the ODL certificate course

S.No.	Category	Average yield before attending the course	Average yield after attending the course	't' value	Degrees of freedom (df)	Significance (two-tailed)
1.	Coconut Production (nuts/tree/year)	89	102	11.668	129	0.000
2.	Coconut productivity (nuts/acre/year)	7475	8349	10.878	129	0.000

Table 2. Income range before and after attending the ODL certificate course

S.No.	Category	Average yield before attending the course	Average yield after attending the course	't' value	Degrees of freedom (df)	Significance (two-tailed)
1.	Gross income (In rupees)	6,34,745	7,14,160	9.842	129	0.000
2.	Net income (In rupees)	4,22,603	5,19,858	12.286	129	0.000

net income increased compared to before and after undergoing the ODL certificate course. The study's results were consistent with the findings made by Ayil and Undiandeye (2022).

The increase in gross and net income of the learners after attending the ODL certificate course might be due to an increase in overall coconut production and productivity by applying the advanced techniques and best practices, like intercropping, drought management, micro-nutrient application, pest and disease management, learned during the course.

Area expansion

According to Table 3, the average area under coconut cultivation by learners before undergoing the ODL certificate course was 7.62 acres, and it was 8.90 acres after attending the certificate course. The results of the paired t-test show a t-value of 11.213, which indicates a significant difference at a 1% level (p-value = 0.000). Hence, it can easily be inferred that the learners expanded the area covered under coconut cultivation after enrolling in the ODL certificate course on coconut cultivation technology. The expansion of the cultivation area may be attributed to their desire to increase income through coconut cultivation, having implemented practices learned during the ODL certificate course. The study's results were consistent with the discoveries made by Akila (2015).

Family expenditure

Table 4 revealed that the learner's average

expenditure for children's education was Rs. 51,830 per year before attending the ODL course. It was Rs. 67,285 per year after attending the certificate course. In contrast, the learner's average expenditure for health concerns was Rs. 23,578 per year before enrolling in the certificate course and it was Rs. 30,690 per year after undergone the ODL certificate course.

The results of the paired t-test show that the t-value = 6.319 and 4.268 of educational expenditure and health expenditure, respectively, had a significant difference at 1% level with p-value = 0.000, and it could be concluded that the expenditure on education and health concerns had increased compared to before and after undergoing the ODL certificate course. The study's findings agreed with those of Ong'ayo *et al.*, (2016). The reason for the increased expenditure may be that learners can utilize the additional income from coconut cultivation to access and quality education for their children and cover family medical expenses.

Farm development

A perusal of Table 5 showed that the learners possessed an average count of 1.68 numbers of machineries and implements before enrolling in ODL certificate course and it increased to 2.25 numbers of machineries and implements, after the learners enrolled in ODL certificate course, when it comes to preparation of input materials by learners before the enrolment in ODL certificate course, the average was 1.40 numbers and it increased to 2.98 numbers

Table 3. Area under coconut cultivation before and after attending the ODL certificate course

S.No.	Category	Average yield before attending the course	Average yield after attending the course	't' value	Degrees of freedom (df)	Significance (two-tailed)
1.	Area under coconut cultivation (In acres)	7.62	8.90	11.213	129	0.000

Table 4. Family expenditure before & after attending the ODL certificate course

S.No.	Category	Average yield before attending the course	Average yield after attending the course	't' value	Degrees of freedom (df)	Significance (two-tailed)
1.	Educational expenditure of children (in rupees/year)	51,830	67,285	6.319	129	0.000
2.	Health expenditure (in rupees/year)	23,578	30,690	4.268	129	0.000

Table 5. Farm development before & after attending the ODL certificate course

S.No.	Category	Average yield before attending the course	Average yield after attending the course	't' value	Degrees of freedom (df)	Significance (two-tailed)
1.	Purchase of machinery and implements for cultivation and value addition	1.68	2.25	5.862	129	0.000
2.	Preparation of input materials	1.40	2.98	9.774	129	0.000
3.	Income-generating enterprises	0.24	0.33	3.622	129	0.000

after the learners completed the coconut cultivation technology certificate course. This part of the data indicates that, after enrolling in the course on coconut cultivation technology, learners have increased their level of engagement in preparing input materials for improving the yield at a lower cost. The average score of 2.98 suggested a higher degree of interest compared to before enrolling in the course. The data in Table 5 also suggested that the average number of enterprises owned by learners before enrolling in the ODL certificate course was 0.24, and after enrolling in the coconut cultivation technology course, the average number of enterprises increased to 0.33. The study's findings agreed with those of Prashad (2014).

The above fact is supported by the 't' value presented in Table 5, which indicates that farm development had a significant difference at a 1% level with a p value of 0.000. It can be concluded that the learners have purchased new machinery and implements for cultivation and value addition, and have started preparing input materials in the farm itself that are required for coconut cultivation. Additionally, a few of them have established new income-generating enterprises after enrolling in the ODL certificate course.

Social impact

This research gauges social impact by quantifying the rise in learners engaging in value addition, exporting coconut products, heightening awareness, knowledge dissemination, and fostering eco-friendly agricultural practices post-enrolment in the ODL certificate course on coconut cultivation technology. Data, obtained from learners and analysed through percentage analysis, are presented in Table 6.

Table 6 indicates that learners, equivalent to one-third of the total, initiated the production of

value-added coconut products like oil, Neera, coir pith, milk, and desiccated coconut. Additionally, one-fourth of respondents began exporting these products domestically and internationally after completing the ODL certificate course. Moreover, over one-third (34 learners) and nearly three-fourths (85 learners) reported heightened access to government schemes and frequent engagement with extension services, respectively. The prestigious certificate awarded by TNAU, coupled with increased social recognition, may have contributed to an altered perception of education's importance. The course, facilitating interactions beyond localities, might influence shifts in communication patterns and behaviours. The study's findings agreed with those of Vidanapathirana *et al.*, (2012).

Additionally, a significant number of participants have successfully applied the technological knowledge gained from the course, earning recognition in their communities. Their innovative efforts, be it launching ventures or effectively utilizing acquired technologies, enhance their standing within social circles. Seventy-eight and one hundred three learners noted an increased awareness, knowledge, and adoption among other coconut growers influenced by their expertise and knowledge sharing. The data in the table also indicate that nearly half of the learners (n = 45) adopted eco-friendly or sustainable agricultural practices, specifically by reducing chemical usage on the farm (n = 57) for crop protection and management in coconut cultivation post-ODL certificate course. This shift may be attributed to heightened awareness about the environmental repercussions of conventional farming methods. The course likely imparted insights into sustainable farming techniques that emphasize

Table 6. Distribution of respondents according to the impact on social status after attending the ODL course

S.No.	Statements	Yes		No	
		Frequency	Per cent	Frequency	Per cent
1.	Started value addition using coconut products	48	36.92	82	63.08
2.	Exporting coconut and its value-added products at domestic and international levels	26	20.00	104	80.00
3.	Access to government schemes and policies is increased	34	26.15	96	73.85
4.	Access to extension and advisory services is increased	85	65.38	45	34.62
5.	Adoption of coconut technology by other farmers due to your knowledge sharing	78	60.00	52	40.00
6.	Increased awareness or knowledge among other farmers due to your influence	103	79.23	27	20.77
7.	Reduced the use of chemical fertilizers or pesticides	57	43.85	73	56.15
8.	Started practicing eco-friendly or good agricultural practices	45	34.62	85	65.38

soil health, biodiversity, and resource conservation. This acquired knowledge could motivate farmers to transition towards eco-friendly practices, recognizing the long-term benefits for farm productivity, the surrounding ecosystem, and their contribution to environmental preservation.

CONCLUSION

In summary, the coconut cultivation technology certificate course from the Directorate of Open and Distance Learning (DODL) at Tamil Nadu Agricultural University (TNAU) has demonstrated a noteworthy positive influence on both the economic and social aspects of the learners. The course's effectiveness is contingent upon the successful application of acquired knowledge in learners' home environments. This factor significantly contributed to the commendable impact observed among the majority of learners.

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Ethics Statement:

The study did not require formal ethical approval, as it involved no sensitive data or invasive procedures. Informed consent was obtained, and participant confidentiality was maintained throughout.

Originality and Plagiarism:

The manuscript is an original work and has not been published elsewhere. All sources and references used have been properly cited, and the authors affirm that the manuscript is free from plagiarism.

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All authors have reviewed the manuscript and agree to its content and to its submission for publication in the journal.

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The authors declare that they have no prevailing conflict of interest.

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All data supporting the conclusions of this manuscript are included within the article.

Author Contributions:

¹Riyas Babu M - conceived the research idea, designed the methodology, and drafted the manuscript.

^{1*}Iniya Vadivel - assisted in data collection, analysis, and manuscript review.

Both authors read and approved the final version of the manuscript.

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