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Factors influencing the utilisation of modern processing techniques in palm oil processing in Iwo ADP zone of Osun State

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Abstract - This study evaluated factors influencing the utilisation of modern processing techniques in palm oil processing. The study was carried out in the Iwo zone of Osun State, Nigeria. The research design used was cross-sectional. Data from 150 palm oil processors in three randomly chosen local government areas was gathered using a multistage sampling technique. A structured questionnaire was used to collect the data, a multinomial logistic regression model and descriptive statistics were used for analysis. The results showed that the use of modern processing methods like local hydraulic presses and mechanical digesters was significantly influenced by access to training ($p < 0.001$) and subsidized equipment ($p < 0.05$). However, age, years of experience, education, and labor availability all had varied degrees of influence on technology choice, even though they were not statistically significant. The findings imply that expanding access to subsidized equipment and improving training opportunities can boost the uptake of modern and effective processing technologies.
Keywords: Palm oil processing, technology utilisation, modern processing techniques, Nigeria, multinomial logistic regression

INTRODUCTION

Palm oil is not only a staple in Nigerian cuisine but also a major industrial raw material. It is used in food manufacturing, cosmetics, pharmaceuticals, and biofuel production (Bankole and Hammed, 2024). The oil is rich in essential fatty acids, vitamin E, and carotenoids, which provide health benefits such as improved heart health and antioxidant properties (Uchenna *et al*., 2024).

Palm oil processing is a crucial aspect of the palm oil value chain, influencing not only the quality of the final product but also the profitability of processors. Over time, various techniques have evolved to improve efficiency and productivity. These techniques can be categorized into two main groups: traditional processing methods and modern processing techniques.

Research has shown that modern techniques improve oil extraction efficiency, reduce processing time, and enhance product quality (Okafor and Alabi, 2023). These techniques not only reduce the reliance on manual labor but also enhance the quality and quantity of oil extracted from palm fruits (Izah and Ohimain, 2015).

However, many processors still rely on traditional methods due to financial constraints, lack of technical knowledge, and limited access to modern equipment (Nwajiuba and Akinsanmi, 2023).

In addition to limiting productivity, the continued use of antiquated and ineffective techniques jeopardizes the sustainability and profitability of processing palm oil in rural areas. Development interventions might not be as successful as they could be if it is unclear what factors influence adoption decisions. Therefore, the purpose of this study is to determine the main variables affecting Osun State's use of various contemporary processing methods for palm oil processing. Gaining an understanding of these elements is essential to creating focused interventions that encourage the adoption of new technologies, enhancing yields, productivity, and the standard of living for those who process palm oil.

METHODOLOGY

This study was carried out in Iwo Zone, Osun State. The study was carried out in Osun State, Nigeria. The State has a total 2 land mass of 9,251 km (3,571.8 sq mi), it is bounded in the north by Kwara State, in the east and south-east by Ekiti and Ondo States, in the south by Ogun State and in the west by Oyo State. According to the 2006 population census, the state has a population of 4, 137, 627 and 30 Local Government Areas with more than 75% of the State's inhabitants as farmers who produce food crops such as yam, maize, cassava, beans and cocoyam. The cash crops produced include tobacco and oil palm. (Ogunleye and kehinde, 2020)

The study employed a cross-sectional survey research design, which involved the collection of data from a representative sample of palm oil processors at a single point in time. This approach was appropriate for identifying patterns in technology use and examining the socio-economic and institutional factors influencing the utilisation of different modern processing techniques.

The target populations for the study were processors involved in oil palm in Iwo Zone, Osun State. Multistage sampling procedure was used to collect data from processors. The first stage involved purposive selection of three Local Government Areas (LGAs) (Ayedaade, Isokan and Irewole) was based on the predominance of oil palm production in the LGAs. The second stage involved random selection of five communities from each of the three Local Governments. The third stage involved

random selection of ten oil palm processors from each of the communities.

A total of 150 respondents were selected based on the estimated population (Ogunleye and Kehinde, 2020) of processors using modern technologies in the selected LGAs. The sample size was determined to ensure sufficient statistical power for regression analysis and adequate representation across equipment types.

Primary data were collected through a structured questionnaire (designed to gather information on processing techniques and equipment used, factors influencing technology adoption) and was administered through interview schedules.

Dependent Variable (Y): The choice of modern palm oil processing equipment used by respondents. It was measured categorically as: 1 = Local Hydraulic Press, 2 = Mechanical Digester

Independent Variables (Zi):

Z_1 = Education level (years): This refers to the level of formal education received by the processor. It is measured by categorical levels (0 = no formal education, 1 = primary, 2 = secondary, 3 = tertiary).

Z_2 = Labour (number of workers): This represents the total number of workers, engaged in processing activities. It is measured as a continuous variable by counting the number of workers employed during processing.

Z_3 = Age (years): This refers to the chronological age of the processor measured in years.

Z_4 = Access to Training (binary): This indicates whether the processor has received training on palm oil processing or equipment use. It is measured as a dummy variable, with 1 = access to training and 0 = otherwise.

Z_5= Processing Experience (years): This is the number of years the processor has been involved in palm oil processing. It is measured in years.

Z_6= Access to Subsidized Equipment (binary): This refers to whether the processor has access to subsidized equipment provided by government or cooperatives. It is measured as a dummy variable, with 1 = access to subsidized equipment and 0 = no access.

A multiple regression was used to analyze factors influencing the use of modern processing techniques

$$log\frac{P_i}{1-P_i} = a_0 + a_1Z_{1i} + a_2Z_{2i} + a_3Z_{3i} + a_4Z_{4i} + a_5Z_{5i} + a_6Z_{6i} + \epsilon_i$$

Where:

Pi = Probability that the *ith* processor uses modern processing equipment

Z_1i: Education level

Z_2i: Labour

Z_3i: Age

Z_4i: Access to Training

Z_5i: Processing Experience

Z_6i: Access to subsidized Equipment

α = Intercept

ϵi = Error term

By focusing on participants' perspectives and the objective of the study as well as information from literature, the study identified key issues relevant to the research objective by analyzing the data. To ensure the themes were accurate and comprehensive, I share the initial list with experts, including my supervisor from the department of agricultural economics, Ladoke Akintola University of Technology for validation.

This study is underpinned by the Diffusion of Innovations Theory, developed by Everett Rogers 1962 (Deborah et al., 2025). It is particularly relevant for analyzing the behavioral and contextual dynamics influencing palm oil processors in Osun State as they interact with emerging processing technologies like hydraulic presses, screw presses, and mechanical digesters.

Rogers posits that the adoption of an innovation is influenced by five key attributes: relative advantage, compatibility, complexity, trialability, and observability.

In the context of this study, relative advantage refers to the extent to which modern palm oil processing techniques are perceived as improvements over traditional methods. Processors are more likely to adopt a new technique if it demonstrably enhances oil yield, reduces labor and time requirements, and increases profitability. Compatibility plays a crucial role in determining whether technology aligns with the social norms, cultural values, and existing operations of processors. If modern techniques can be integrated into the daily routines and organizational structures such as cooperative work settings or family labour systems, they are more likely to be embraced. Conversely, if a technique conflicts with traditional knowledge, gender roles, or available labor arrangements, its adoption may be resisted regardless of its technical efficiency.

The perceived complexity of modern equipment also influences its adoption. Techniques that are seen as too technical, mechanically sophisticated, or maintenance-intensive may discourage usage, especially among processors with limited formal education or technical training. Ease of use, clarity in operation, and local availability of spare parts can reduce this barrier and encourage broader utilisation.

Trialability, or the opportunity to experiment with the technology on a small scale before full commitment, is particularly important in rural contexts where investment risks are high. Processors in Osun State may be more willing to utilise a new processing machine if they have previously observed or tested it during training sessions, cooperative pilot projects, or through

borrowing arrangements. This gradual exposure allows them to assess performance, cost implications, and operational challenges without bearing the full initial burden of acquisition.

Lastly, observability pertains to how visible the benefits of a new technique are to others in the community. When early adopters visibly achieve higher-quality oil, greater output, or reduced processing time, others are likely to emulate them. In rural processing hubs where knowledge transfer often occurs informally through peer observation and experience sharing, this attribute is particularly powerful in driving wider adoption of modern techniques.

Overall, Rogers' Diffusion of Innovations Theory provides a comprehensive lens through which the varying levels of adoption of modern processing techniques in Osun State can be understood. It underscores that beyond the technical superiority of equipment, socio-economic, cultural, and informational factors critically shape the utilisation behavior of processors. This theoretical grounding informs the analysis of determinants explored in this study.

RESULTS AND DISCUSSION

Demographic information of respondents

According to Table 1.0, 34.7% of respondents were men and 65.3% of respondents were women. This suggests that there are more women than men. This may be because the majority of people who work in the palm oil processing industry are women. This is in line with previous research that highlights the important role that women play in Nigerian agricultural processing, particularly in the oil palm subsector (Ayanwale *et al*., 2020).

According to the table, the respondents' ages ranged from 21 to 70 years old and 40.9% of respondents are between the ages of 36 and 45, 35.6% are between the ages of 46 and 55, 21.5% are between the ages of 56 and 65, 1.3% are over 66, 0.7% are between the ages of 26 and 35, and 0% are between the ages of 18 and 25. The respondents' average age was 48. This suggests that the majority of the people processing palm oil are adults. Additionally, the table showed that 44% were divorced, 3.3% were widowed, 52% were married, and 0.7% were single. The majority of respondents were likely married, based on this finding. Higher household responsibilities are frequently linked to marital status, and this can have an impact on investment behavior as well as production goals. Married processors may be more likely to embrace time-saving technologies in order to satisfy domestic demands (Obayelu *et al*., 2017).

The table displays the respondents' educational attainment. About 10.7% of the respondents have no formal education, 22.7% have primary education, 21.3% have tertiary education, and 45.3% have secondary education. Secondary education accounts for the largest percentage of respondents, at 45.3%. Particularly in cases involving documentation, technical manuals, or digital interfaces, the comparatively low levels of formal education may hinder awareness and adoption of improved techniques.

Table 1.0: Demographic characteristics of the respondents

Variables	Group	Frequency	Percentage (%)
Sex	Male	52	34.7
	Female	98	65.3
Age Group	18–25	0	0.0
	26–35	1	0.7
	36–45	61	40.9
	46–55	53	35.6
	56–65	32	21.5
	66+	2	1.3
Marital Status	Single	1	0.7
	Married	78	52.0
	Divorced	66	44.0
	Widowed	5	3.3
Education Level	No Formal Education	16	10.7
	Primary	34	22.7
	Secondary	68	45.3
	Tertiary	32	21.3
Processing Experience	< 5 Years	2	1.3
	6–15 Years	15	10.0
	16–25 Years	65	43.3
	26–35 Years	60	40.0
	Above 35 Years	8	5.3

The table also reveals that 43.3% of respondents processing experience are between the ages of 16 and 25, 40% are between the ages of 26 and 35, 10% are between the ages of 6 and 15, 5.3% are over 35, and 1.3% are under five. Respondents aged 16 to 25 years have the largest percentage of processing experience (43.3%). With an average of 24.5 years of experience, processors appear to have deeply ingrained traditional knowledge. Experience is useful for production planning and technical know-how, but unless backed by training, it can also be associated with conservatism when implementing new practices.

The logistic regression model demonstrates excellent predictive performance in classifying the utilisation of modern palm oil processing techniques. The model accurately separates users from non-users of modern equipment with an accuracy rate of 88%, sensitivity of 98.46% and 20%, and specificity of 98.52% and 20%. The model's exceptional discriminatory power is confirmed by its AUC value of 0.98. With a low AIC (29.94) and a high pseudo R2 (McFadden = 0.6447), the model also exhibits strong goodness-of-fit, suggesting that the predictors account for a significant amount of the outcome's variability.

Table 2.0: Performance measures for the logistic regression model

Measures	Value
Accuracy Rate	88%
Sensitivity (Local Hydraulic Press)	20%
Sensitivity (Mechanical Digester)	98.46%
Specificity (Local Hydraulic Press)	98.52%
Specificity (Mechanical Digester)	20%
AUC (ROC Curve)	0.98
AIC	29.94
BIC	169.2
Pseudo R^2 (McFadden)	0.6447

Source: Data analysis, 2025

Education - Table 3.0 presents multinomial logistic regression results indicating the influence of education on the utilisation of different modern palm oil processing techniques. For processors using the local hydraulic press, the coefficient for education was $\beta = 0.204$ with a p-value = 0.346, while the odds ratio (OR) of 1.226 suggests a 22.6% increase in the likelihood of adopting the local hydraulic press relative to the hand screw press for each additional level of education attained. However, this relationship was statistically insignificant, implying that educational attainment did not meaningfully influence the adoption of the local hydraulic press among processors.

On the other hand, for users of the mechanical digester, the coefficient of $\beta = -0.505$ and a p-value = 0.065 (significant at the 10% level) implies a negative relationship between education and the likelihood of using the mechanical digester compared to the hand screw press. The associated odds ratio of 0.603 suggests that as education increases by one level, the odds of using the mechanical digester (relative to the hand screw press) decrease by approximately 39.7%. This inverse relationship, although marginally significant, might reflect contextual realities where more educated individuals may be less involved in hands-on processing or may shift toward managerial roles or alternative income-generating activities outside direct processing.

This finding diverges from conventional expectations, as many prior studies have consistently shown that education is positively associated with the adoption of improved agricultural technologies.

Conversely, the current study's finding partially aligns with Tey and Brindal (2012), who argued that while education increases awareness, it may also lead to diversification of livelihood away from primary processing activities, particularly in rural areas where better-educated individuals may explore other business opportunities or seek white-collar jobs. Moreover, Mignouna *et al.* (2011) posited that education's effect on technology adoption is highly context-specific, depending on factors such as the perceived complexity of the technology, cultural acceptance, and economic incentives. Although education is theoretically linked to increased technology adoption, this study finds its role to be weakly significant and directionally mixed.

Labour - The results in Table 3.0 show the estimated influence of the number of workers (labour) engaged by palm oil processors on their likelihood of utilising different modern processing techniques relative to the baseline category (hand screw press). For processors utilising the local hydraulic press, the coefficient for labour was $\beta = 0.786$ with a p-value = 0.548, while for those using the mechanical digester, the coefficient was $\beta = 0.897$ with a p-value = 0.443. Although both

coefficients were positive and the corresponding odds ratios were 2.194 and 2.452 respectively, neither relationship was statistically significant at conventional levels ($p < 0.05$).

Despite the lack of statistical significance, the direction of the relationship suggests that an increase in the number of labourers employed in palm oil processing is associated with a higher probability of adopting both the local hydraulic press and the mechanical digester. This could be attributed to the fact that modern equipment, although more efficient, may still require considerable human involvement for ancillary tasks such as loading, sorting, monitoring, and post-processing activities. As such, processors with greater access to labour may find it easier to integrate mechanized techniques into their operations without facing production bottlenecks.

The positive but non-significant result aligns with the findings of Adekanye *et al.* (2013) who studied cassava processing in Nigeria and noted that the availability of labour positively influences the decision to adopt improved processing equipment. They argued that modern technologies, especially in traditional agro-processing, often complement rather than replace human labour. However, the absence of statistical significance in the present study could reflect contextual limitations such as small operational scale or the presence of idle labour not efficiently utilised in processing operations. In line with this, Kassie *et al*. (2011) noted that while the presence of labour increases the capacity to operate improved technologies, its effect is conditional upon the scale of processing, cost of labour, and nature of the technology involved.

Although labour appears to have a positive association with the adoption of modern processing techniques, this relationship is not statistically significant in this study. Nevertheless, it remains a relevant operational factor.

Age - As shown in Table 3.0, the study examined the influence of the processor's age on the likelihood of adopting different modern palm oil processing techniques, using the hand screw press as the reference category. For the local hydraulic press, the coefficient for age was $\beta = 0.016$, with an odds ratio of 1.016 and a p-value of 0.845. For the mechanical digester, the coefficient was $\beta = -0.090$, with an odds ratio of 0.914 and a p-value of 0.251. These results were statistically insignificant at the 5% level, suggesting that age does not exert a strong or consistent influence on the choice of technology among palm oil processors in the study area.

Despite the statistical insignificance, the signs of the coefficients provide some interpretive insights. The positive coefficient (OR > 1) for the local hydraulic press implies a weak tendency for older processors to adopt this intermediate technology. In contrast, the negative coefficient for the mechanical digester indicates a slightly reduced likelihood of adoption as age increases. This contrast suggests that while some older processors may be open to modest improvements (i.e., local hydraulic press), they might be less inclined to embrace more complex and capital-intensive technologies like the mechanical digester.

These findings are somewhat consistent with previous studies. Mwaipungu *et al*. (2023), in their study on tomato farmers in Tanzania, reported that age positively influenced the adoption of modern farming technologies, citing that older farmers tend to possess greater farming experience, risk tolerance, and decision-making authority. Similarly, Dissanayake *et al.* (2022) found a significant relationship between age and technology adoption in Sri Lanka's agricultural sector, noting that older farmers might adopt technologies they deem compatible with their accumulated knowledge and practices.

However, other studies have presented mixed results. For instance, Gebre *et al*. (2019) reported no significant effect of age on technology adoption in Ethiopia, attributing this to variations in education, risk perception, and access to finance across age groups. Likewise, Vecchio *et al*. (2020**)** argued that in certain agrarian contexts, younger processors may actually be more open to modern techniques due to higher levels of education and technological literacy, despite limited access to capital. In Nigeria, Kehinde (2021) also observed that younger palm oil processors were more inclined to adopt new innovations when provided with adequate training and support mechanisms.

Furthermore, the adoption of mechanized techniques may depend more on external enabling factors such as training, subsidies, and capital availability rather than age alone. This aligns with the view of Balana *et al.* (2022), who emphasized the mediating role of institutional support in shaping the relationship between socio-demographic traits and technology uptake.

In conclusion, while age may shape individual attitudes toward modern processing techniques, it does not emerge as a decisive factor in this study. Nonetheless, understanding age-related preferences can inform the customization of extension messages, ensuring they resonate with processors at different life stages.

Access to training - Access to training emerged as a highly significant predictor of the utilisation of modern processing techniques in palm oil processing. As shown in Table 3.0, the coefficient for local hydraulic press was $\beta = 12.178$ ($p < 0.001$), with an exceptionally high odds ratio (OR) of 193,551.8 and a 95% confidence interval (CI) of 53,201 – 704,405.9. Similarly, for the mechanical digester, the coefficient was $\beta = 9.992$ ($p < 0.001$), OR = 21,817.3, CI = 5,992.4 – 79,464.6. These

results indicate that processors who had access to training were significantly more likely to adopt either type of modern processing equipment than those who relied on traditional methods such as the hand screw press.

The extremely large odds ratios, although unusual, are consistent with a strong and statistically robust effect, highlighting the pivotal role of training in facilitating technology adoption. Access to training enhances the processor's technical competence, operational confidence, and familiarity with the mechanical or semi-mechanical features of modern equipment. These competencies are especially important for technologies like hydraulic presses and mechanical digesters, which often require knowledge of assembly, maintenance, and troubleshooting (Doss, 2006).

More broadly, access to training contributes to the reduction of perceived complexity and risk associated with new technologies two core constructs in Rogers' Diffusion of Innovations theory (Rogers, 2003). Training also offers opportunities for hands-on experimentation (trialability) and observation of outcomes (observability), which significantly influence adoption decisions in communal agricultural settings. Therefore, the observed relationship may be due not only to the technical knowledge gained, but also to the social validation and trust that training fosters.

This finding aligns with studies across Sub-Saharan Africa, which have consistently demonstrated that access to extension and training services increases the likelihood of adopting improved agricultural technologies. For example, Mignouna *et al*. (2011) found a positive link between extension access and the adoption of biotech maize in Kenya. Similarly, In the context of Nigeria's palm oil sector, Ogundari and Bolarinwa (2018) emphasized that access to well-designed, hands-on training programs is a critical enabler for mechanization and efficiency gains in small-scale processing enterprises.

The implication of this result is that improving training access should be a top priority for policymakers, NGOs, and other actors interested in upgrading palm oil processing in Nigeria. The extremely strong statistical significance of training in this model suggests that training interventions, when effectively designed and delivered, could be one of the most cost-effective strategies for promoting the adoption of modern processing techniques in the sector.

Experience - The influence of processing experience on the adoption of modern palm oil processing technologies was examined, and the results in Table 3.0 show that experience was not statistically significant in predicting the likelihood of using either the local hydraulic press ($\beta = 0.129$, $p = 0.238$, OR = 1.138) or the mechanical digester ($\beta = 0.048$, $p = 0.614$, OR = 1.049). Despite the lack of statistical significance, the positive coefficients in both cases suggest a slight tendency for more experienced processors to utilise modern techniques, even though the effect is marginal and inconclusive.

The odds ratio of 1.138 for the local hydraulic press implies that with every additional year of experience, the odds of adopting this technology increase by approximately 13.8%, though this result is not significant at the 5% level. Likewise, the OR of 1.049 for mechanical digester users suggests an even smaller increase of 4.9% per year of experience. This pattern indicates that while experience may contribute modestly to the decision to adopt newer processing equipment, it does not strongly determine technological choice in the context of palm oil processing in Osun State.

These findings are somewhat contrary to the conventional belief that longer years in production are typically associated with greater technological adoption, due to accumulated knowledge, exposure, and capacity to manage processing innovations (Akinola *et al*., 2019). In particular, Adenegan and Olagunju (2012) found that experience significantly influenced the likelihood of adopting mechanized technologies in cassava processing, attributing this to the processors' increased familiarity with the operational demands and economic benefits of modern tools.

However, the current results align more closely with a study by Ojo *et al*. (2019), which argue that experience may only play a secondary role when access to capital, institutional support, and market incentives are lacking. In such contexts, even highly experienced processors may continue using traditional or semi-traditional methods due to constraints beyond their control. Moreover, Reimers and Klasen (2013) note that in some low-income rural settings, older or more experienced farmers may resist adopting new technologies if they perceive them as risky or if they have already optimized their production routines with older methods.

In conclusion, while processing experience shows a positive but non-significant influence on the use of modern processing equipment in this study, its effect should not be dismissed outright.

Access to subsidised equipment - Access to subsidized equipment was found to be a statistically significant predictor of the utilisation of modern processing technologies in palm oil production. As indicated in Table 3.0, the coefficient for access to subsidized equipment in predicting the use of the local hydraulic press was $\beta = 1.811$ with a p-value of 0.019, and an odds ratio (OR) of 6.116 (95% CI: 1.349–27.727). Similarly, the coefficient for

predicting the use of mechanical digester was β = 1.607, with a p-value of 0.006 and an OR of 4.986 (95% CI: 1.602–15.520). These findings imply that processors who had access to subsidized equipment were about 6 times and 5 times more likely, respectively, to adopt hydraulic presses and mechanical digesters than those who did not have such access, holding all other factors constant.

This strong positive relationship aligns with the economic logic that subsidies lower the cost of acquisition, making capital-intensive equipment more financially accessible to small- and medium-scale processors. In resource-constrained rural environments where capital markets are underdeveloped, subsidies act as critical enablers by offsetting upfront investment costs that would otherwise be prohibitive (Jack, 2013).

Subsidized programs often bridge the gap between awareness and actual use of technology by mitigating the risk of financial loss and encouraging initial adoption. For instance, Ogundari and Bolarinwa (2018) noted that equipment subsidies in Nigeria significantly boosted the uptake of mechanized technologies in agricultural processing.

The role of subsidies is not only economic but also psychological. The mere act of receiving subsidized support can signal government or institutional endorsement, boosting user confidence in the reliability and legitimacy of the technology (Cai *et al*., 2016). This aligns with Rogers' (2003) concept of "observability" and "trialability" within the Diffusion of Innovations theory, where visible external support can encourage broader community adoption.

While the positive effect of subsidies is well-documented, it is also essential to recognize the importance of proper targeting and sustainability. Misallocation or lack of follow-up support could lead to underutilisation or misuse of subsidized equipment. Therefore, subsidies should be designed to reach the most constrained but capable processors, with complementary measures such as training, technical support, and access to spare parts.

Table 3.0: Multinomial logistic regression analysis for factors influencing utilisation of different modern processing techniques

Variables	Category	Coefficient (β)	Std. Error	p-value	Odds Ratio (OR)	95% CI (Lower–Upper)
Education	Local Hydraulic Press	0.204	0.215	0.346	1.226	0.797 – 1.887
	Mechanical Digester	-0.505	0.278	0.065 †	0.603	0.349 – 1.041
Labour	Local Hydraulic Press	0.786	1.311	0.548	2.194	0.165 – 29.238
	Mechanical Digester	0.897	1.172	0.443	2.452	0.250 – 24.064
Age	Local Hydraulic Press	0.016	0.083	0.845	1.016	0.860 – 1.200
	Mechanical Digester	-0.090	0.078	0.251	0.914	0.784 – 1.066
Access to Training	Local Hydraulic Press	12.178	0.658	<0.001***	193551.8	53201 – 704405.9
	Mechanical Digester	9.992	0.658	<0.001***	21817.3	5992.4 – 79464.6
Experience	Local Hydraulic Press	0.129	0.110	0.238	1.138	0.914 – 1.416
	Mechanical Digester	0.048	0.095	0.614	1.049	0.868 – 1.268
Access to subsidised Equipment acquisition	Local Hydraulic Press	1.811	0.764	0.019*	6.116	1.349 – 27.727
	Mechanical Digester	1.607	0.583	0.006**	4.986	1.602 – 15.520

Source: Data analysis, 2025

CONCLUSION AND RECOMMENDATIONS

The findings showed that the likelihood of implementing the mechanical digester and the local hydraulic press was considerably raised by having access to training and subsidized equipment. These results confirm how important affordability and institutional support are in promoting the move to automated processing.

Despite not being statistically significant predictors in the final model, other factors like age,

experience, education, and labour availability show varying degrees of influence based on their odds ratios. Overall, the results show that policy initiatives that focus on increasing training opportunities and guaranteeing steady access to subsidized processing equipment can significantly impact the adoption of new technologies. These can then enhance the quality of the oil produced, the efficiency of processing, and eventually the earnings and standard of living of processors throughout in Iwo Zone.

The study provides the following recommendations:

1. The Osun State Ministry of Agriculture should collaborate with agricultural development programs and non-governmental organizations to arrange frequent, on-site training sessions for palm oil processors, as training access was the most important predictor of modern technology utilisation.
2. The government and donor organizations should establish equipment subsidy programs because they have a significant positive influence on the adoption of both local hydraulic presses and mechanical digesters. To remove financial obstacles, particularly for small-scale processors, a flexible hire-purchase arrangement might be implemented.
3. In order to close the gap between affordability and accessibility, palm oil cooperatives ought to receive assistance in purchasing processing equipment that their members can utilise at reduced costs. Low-interest loans and grants should be made available by the Ministry of Commerce and Industry in collaboration with cooperative unions to support cooperatively based equipment procurement.
4. To create an enabling environment, cooperation between research institutes, commercial equipment producers, agricultural extension services, and financial institutions ought to be encouraged. This includes creating loan products that are easy for processors to process and sharing information via reliable community channels.

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