

**DETERMINANTS OF COMPETENCE IN SOYBEAN PROCESSING AMONG  
SECONDARY SCHOOL STUDENTS IN IBADAN, OYO STATE, NIGERIA****Fadairo AO<sup>1\*</sup>, Oyegbami A<sup>1</sup> and MO Oyedokun<sup>1</sup>****Fadairo Anjolaoluwa**

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## ABSTRACT

Competence in the processing of soybean is constrained by many factors which directly influence the consumption pattern in Nigeria. Youth involvement in soybean processing is a strategy to successfully incorporate soybean utilization in households across South-west Nigeria. The study identified factors that influence competence in soybean processing among secondary school students in Ibadan metropolis of Oyo state. The study is an offshoot of a training activity embarked by Institute of Agricultural Research and Training, (IAR&T) Ibadan to improve the knowledge of soybean processing among secondary students. Thus, study purposively selected three secondary schools adopted by the Institute and all the senior secondary students formed the study population. However, 30% of the senior students were randomly sampled which gave a total of 203 respondents. Independent variables such as personal characteristics of students, knowledge of benefit of soybean and competence in the processing of soybean were collected using validated questionnaire. Competence was measured in a four-point scale of high competence, average competence, low competence and no competence. Data were described using percentage and mean, and were analyzed using Analysis of Variance (ANOVA), Chi square, Pearson Product Moment Correlation (PPMC), and multiple regression analysis. Findings revealed that the mean age of respondents was 15.9 years and majority (57.6%) was female. Highest education attained by mothers (57.1%) was secondary education and majority (62.6%) of mothers was involved in trading. The knowledge of benefit of soybean was high among majority (64.1%) but majority (62.0%) also had low competence in soybean processing. Data analysis revealed a significant relationship ( $p < 0.05$ ) between gender ( $\chi^2 = 17.7$ ), class of students ( $\chi^2 = 20.3$ ) and competence in soybean processing. Level of mothers' education (65%) and knowledge of benefits of soybean (42%), respectively had positive effect on students' competence. The study concludes that competence in soybean processing among secondary students is limited to some few products such as soymilk and it is associated with many factors like knowledge of its benefit and mothers' education

**Key words:** Competence, Knowledge, Soybean processing, nutrition, secondary schools students, adopted schools



## INTRODUCTION

Soybean contains major vitamins and minerals lacking in other legumes and some cereals. It contains 40% high quality protein, 20% edible vegetable oil and a good balance of amino-acid and has, therefore, tremendous potential to improve nutritional status and welfare of the families of resource - poor farmer [1]. Likewise, nutritionally, soybeans carry twice the protein of meat or poultry and contain all eight essential amino acids needed for childhood development and are also good for the environment [2]. Soybean foods have become a popular protein source used as an alternative to expensive meat, fish, and egg in many rural- and urban-poor homes to reduce protein malnutrition, especially in children [3].

However, despite the huge benefits in soybean, the processing and utilization in Nigeria is limited by many factors which include lack of knowledge of its processing, erroneous cultural beliefs, improper processing technique, and high level of perishability of the product [4]. These constraints have several implications to the state of nutrition of every individual and also constitute a major setback to the achievement of the sustainable development goal of eradicating hunger. Constraints to utilization of soybean could have negative impact on the consumption pattern and rate of production of the product [5]. Processing constraints also limit the impact of the produce on improving the nutrition level of the low income populace. Beside the processing challenges, lack of knowledge of soybean use has limited its adoption and processing in non-traditional areas of cultivation [6]. This factor further limits the extent to which the produce is utilized as soybean producers only utilize their produce for limited products and for income generation [7].

Inadequate nutrition is perhaps the most important problem facing the poor people in the world [8]. In Nigeria, malnutrition is still a devastating concern the problem of malnutrition affects not only the people but imposes ripple effect on the security and economy of the citizens. According to Kuku-Shittu *et al.* [9], malnutrition is concentrated in the rural areas of Nigeria, as well as the northern strip, and primarily affects poor women and children. The effect on children and adolescents is particularly severe. Adolescents' years are crucial for normal physical and mental development, and the diet and eating behaviors that develop during these years tend to persist throughout life [10]. However, on the adoption and knowledge of soybean, Sangiya *et al.* (1999) found that farmers of this age category are more educated and innovative than older farmers, and may also have a lower level of risk averseness towards technology adoption. Consumption pattern also could be helped by correcting erroneous impression and developing appropriate technology that will reduce the time and labour expended on its processing [12]. In view of this, efforts to promote soybean knowledge and processing competence should target the adolescents who are increasingly becoming an important force in rural economies [11].

Youth involvement in soybean processing is a strategy to successfully incorporate soybean utilization in households across South-west Nigeria. Institute of Agricultural Research and Training (IAR&T) introduced soybean to her three adopted secondary schools in Ibadan and trained the senior classes on its processing and packaging into different products. Packaging of soybean products would not only add value but it will



also encourage the students to engage in income generating activities. Although high rate of unemployment tends to increase the number of people especially women involved in processing and street-vending of foods as a means of livelihood for sustenance of their families [13], this is not really applicable to soybean processing where it was found that inadequate knowledge of the processing of soybean was a major constraint to its utilization among farmers [14]. Thus, the target of the IAR&T training was to improve the knowledge of the students on soybean processing for inclusion in household diets and also in its marketing. However, several studies [4, 5, 6] have found that soybean processing is associated with several other factors. There is a need for agricultural extension to identify predictors for youth participation in development in order to increase their participation [15]. This study hypothesized that some personal characteristics and knowledge of benefits of soybean are strong factors that influence competence in soybean among secondary school students, and thus identified the extent of contribution of these factors to competence. It is in this vein that this study assessed the factors that determine the competence in soybean processing among IAR&T secondary school students in Ibadan metropolis of Oyo state.

The study identified factors that contribute to students' level of competence in soybean processing in Oyo state. Specifically, the following objectives were considered:

- 1.
2. To identify personal characteristics of the students that are relevant to the study
3. To determine the level of knowledge of the benefits of soybean among the students
4. To investigate the extent of competence of soybean processing among the students
5. To identify major factors that contribute to the competence level in soybean processing among the students

## METHODOLOGY

**Study area** - The study area is Ibadan, Oyo state. The three secondary schools adopted by Institute of Agricultural Research and Training, Ibadan used in the study are located at different geographical areas of the city metropolis (Figure 1).

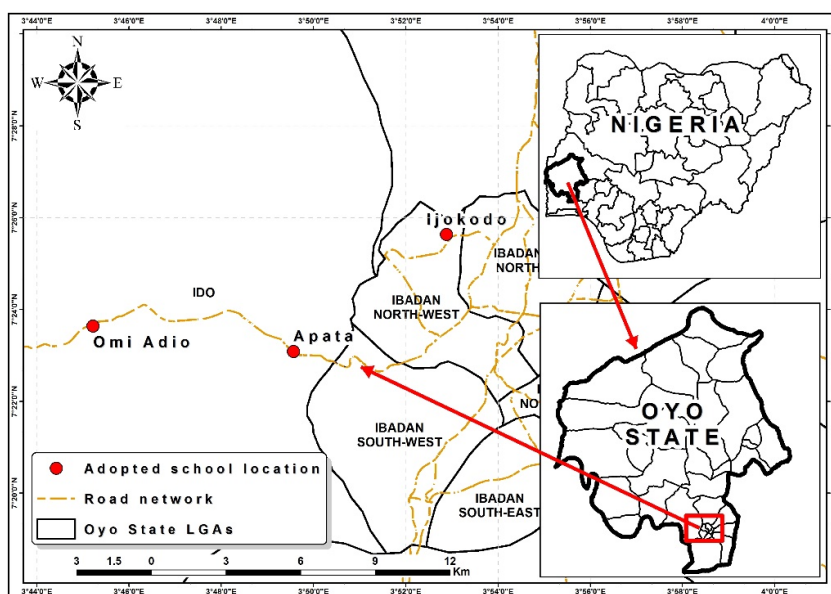


Figure 1: Map of the study area

**Study population** – All the Senior Secondary Students in the adopted school participated in the study.

**Sampling technique and sample size-** Two-stage sampling method was used in the study. The schools were purposively selected in the first stage; this is because the students had been trained by the extension unit of the Institute on the processing of different products of soybean. Second stage involved the random sampling of 30% of the total population of secondary students; 266 from United Secondary School (USS), Ijokodo, 215 in United Christian Secondary School (UCSS), Omi-Adio and 196 in Ibadan Municipal Government (IMG) School, Apata. These were 80 students from USS, Ijokodo, 64 from UCSS, Omi-Adio and 59 from IMG Apata, Ibadan. This made a total of 203 respondents interviewed for the study.

**Data collection** - The study used primary data which were collected through the administration of structured questionnaire consisting of both open- and closed- ended questions.

**Measurement of variables-** The independent variables measured in the study are: Personal characteristics- Respondents' personal characteristics were recorded to ascertain their relationship with the level of competence in soybean production. These characteristics include age, gender, class of student, parents' major occupation and education status.

Knowledge of benefit of soybean utilization- Ten knowledge statements comprising both positive and negative worded items were presented to the students and responses were obtained on yes or no options.

The dependent variable- Competence in soybean processing is the dependent variable. It was measured on a 4-point scale of High competence (4) Average competence (3) Low competence (2) and No competence (1).

**Data analysis-** Data collected were summarized with the use of descriptive tools such as frequencies, percentages and means while inferential statistics such as Chi-square, Person Product Moment Correlation (PPMC), analysis of variance and linear regression analysis were used to describe the relationships between the independent and dependent variables.

## RESULTS AND DISCUSSION

Table 1 presents the distribution of the students based on some relevant personal characteristics to their soybean processing competence and use. The table shows that the mean age of the students was 15.88 years, majority (57.60%) were female and were in senior secondary class 2 (51.2%). About half (49.3%) of the students indicated that the highest education attained by their father and mother (57.1%) was secondary education. The students fathers' occupation ranged from trading (37.4%), artisanship (25.1%) to



government civil service work (23.6%), and a good proportion (62.6%) of the mothers were into trading.

These results show that the students were in their middle teen age implying that they should be more inquisitive and far less concerned about the decisions to process or utilize soybean product. The result also shows that more females are in IAR&T adopted secondary schools in Ibadan. The school in the center of the city (United secondary school, Ijokodo), has more students than those at the interior parts, which indicates that population distribution influences school attendance in the city suggesting that as the population increases, more students enroll in the school. That the parents were engaged in petty trading also suggests that the students would have to sacrifice more time to support their parents in generating income for the home, which invariably exposes them to more knowledge in such home or business activities since knowledge is transferred from generation to generation through education [16].

### **Knowledge of benefit of soybean by respondents**

Table 2 (a) shows a list of 10 knowledge statements used to assess the level of knowledge of the benefit of soybean among the respondents. A score of 2 was awarded for *yes* and 1 for *no* for positive answers and the reverse for negative answers. The table reveals an averagely high knowledge of benefit of soybean among the respondents for both positive and negatively worded statements. Majority (94.6%) of the students indicated high knowledge of the benefit of soybean to improve nutritional status of its consumers, thereby helping to fight malnutrition in both adults and children (86.2%). This suggests that the students consume soybean or the products of soybean with the belief that it can help improve their nutrient status.

On the other hand, statements on benefit of soybean for pregnant women were least acknowledged (25.6%). The reason for this is not far-fetched as the students might not have been bothered much about issues of pregnancy and childbearing.

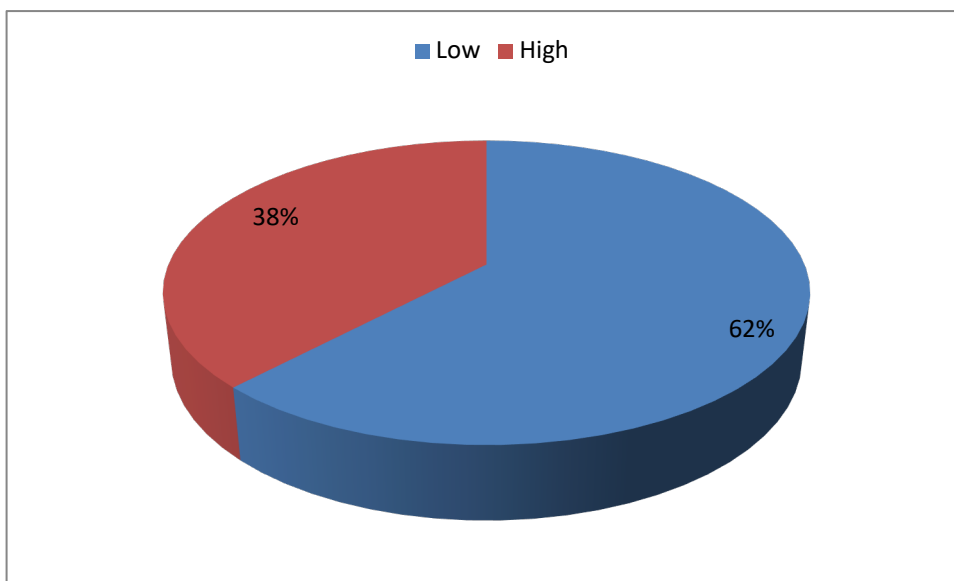
Furthermore, Table 2 (b) shows the categorization of respondents into high and low knowledge of benefit of soybean. A mean score of  $17.0 \pm 1.66$  with a minimum of 12 and maximum score of 20 was obtained.

The table reveals that more than half (64.1%) of the respondents had a high knowledge score of between 17 and 20 of benefit of soybean. This finding further affirms the responses obtained in table 2(a) of high knowledge of the benefit of soybean. Knowledge of benefit of soybean is high among the students. This result is expected as it justifies the several training sessions held with the students on processing of soybean and the importance to the health. The multiplier effect of the increased knowledge should be the eagerness at which soybean is processed and consumed in their homes which will reflect in the level of competence in its processing. A similar work with rural farmers found that farmers who perceive the benefits of soybean products will, more likely, continue to adopt a soybean product [2]. However, in a similar study among young female adults in Ibadan, it was discovered that there exists a poor knowledge of what constitutes good nutrient intake for infants and nursing mothers among majority interviewed [17]. This implies that the benefit of soybean accrued by the students was only limited to how it

relates to their well-being and not others. The high knowledge by the majority of the students thus suggests a high retention of facts about soybean disseminated during training or possibly some familiarity with the soybean and its products but this may not necessarily have influenced their competence of its processing and daily consumption.

### Competence in soybean processing

Table 3 presents the distribution of students according to their level of competence in different soybean products presented to them. The table shows that by ranking, the students had highest level of competence in soymilk processing ( $\bar{x}=2.34$ , followed by the processing of soy yogurt ( $\bar{x}=1.70$ ) and soy akara ( $\bar{x}=1.62$ ). On the other hand, the students had least competence in the processing of Dadawa ( $\bar{x}=1.36$ ) and soygari ( $\bar{x}=1.40$ ). While pooling the scores together to categorize the respondents, a mean score of  $19.32\pm 8.09$ , a minimum score of 12 and maximum score of 40 were generated for the students and were used to categorize the students into either high competence or low competence in soybean processing. Categorization of the students based on their level of competence in soybean processing shows that majority (62.1%) had low levels (having scores of between 12.00 and 19.32) of competence in soybean processing. It can be inferred from this result that the high knowledge of benefit of soybean products shown by respondents in table 2 (b) did not translate directly to their competence. This finding also denotes that competence in the processing of soybean products is associated with other factors specific to either the use of soybean or the personality of the respondents, which is beyond knowledge of its benefits.



Min- 12, Max – 40: Mean –  $19.32\pm 8.09$

**Figure 1: Categorization of respondents based on level of competence**

Of all the products of soybean available in southwestern Nigeria, soymilk has been found to be more common and available [6], which could be as a result of ease of the processing. However, it could also be inferred that complex processing procedures and low awareness is limiting the processing competence of other soybean products such as soy yogurt and soy gari. Lack of access to labor-saving technologies for soybean

production and processing has limited its production [19]. Factors such as erroneous impression, high consumption of time, fuel, labor and inappropriate use of technology were identified [4, 12] as constraining the processing of soybean products both industrially and locally.

### **Relationship between personal characteristics and level of competence in soybean processing**

Table 4 shows that there is a significant relationship between the gender ( $X^2= 17.71$   $p < 0.05$ ), school of the students ( $X^2=9.001$   $p < 0.05$ ), the class of students ( $X^2= 20.26$   $p < 0.05$ ) and their competence in soybean processing, while no significant relationship existed between age of students ( $r= -0.06$ ), father's education, mother's education, father's major occupation, and mother's major occupation ( $X^2= 1.34; 5.93; 0.73; 2.11$ ;  $p > 0.05$ ), respectively for the variables. The significant relationship between the gender of students and level of competence suggests that the gender of a secondary school student influenced the interest and quest for knowledge in soybean processing. Table 1 of this study had found that there are more female students in the school, which could have influenced the result; however, the result is not completely out of place as society endows more responsibility in the home on the girl child, thus the possibility of higher level of competence in soybean processing in the female than in the male counterpart. Likewise, the school also influenced the students' competence in soybean processing. The three adopted schools used for the study are public secondary schools located in different areas of the city metropolis but operate with the same curriculum.

In line with this position, limited time and finance available to the students might not have been sufficient to process soybean regularly enough as to gain mastery of it. It could, therefore, be inferred that what influenced the level of significance could be the level of urbanization of the location of the school. Several studies have found that utilization of soybean is helped by the production [7]. The result implies that students in the two interior schools (UCSS and IMG) of the metropolis might have been more motivated to process soybean because of better exposure to its production.

Furthermore, students in the lower class of senior secondary school may not be too concerned with acquiring more knowledge of the processing of soybean when compared with the senior classes. This is because SS2 and SS3 students are more focused in the skill development classes in Secondary Schools across the state. This is necessary as the training would prepare them for life after secondary school and guide their choice of career in the University. Several studies in literature have associated maternal education with the nutrient status and knowledge of nutrition among children [20, 21]. On the other hand, students are still very inquisitive at this stage, and there is high tendency that they would try whatever knowledge they acquire because education allows one to think beyond what is told [22], and knowledge is transferred from generation to generation through education. Thus, the study found that mother's level of education has much contribution to the level of competence attained by their wards.

### **Contribution of variables to the level of competence in soybean processing**

Table 5 shows the level of contributions of related variables to the students' competence in soybean processing. The table shows that the variables captured in the study could





account for up to 54.9% (Adjusted  $R^2 = 0.549$ ) of the variation in students' competence in soybean processing. This implies the possibility of other non-captured factors surrounding the students, which have contributed to the processing of soybean. However, mothers' level of education ( $\beta = 0.65$  P- 0.043) and students' knowledge of benefit of soybean ( $\beta = 0.422$  P- 0.000) were major contributors to competence in soybean processing among the students. Mother's education level influenced more competence in soybean processing than students' knowledge of the benefit. It will not be out of place to assume that one of the contributors could have influenced the other. Secondary students are assumed to still be under the guidance and tutorship of their parents, and thus the level of mothers' education could have positively influenced the knowledge of benefit of soybean attained by the students.

### **Difference in the level of competence in soybean processing among different secondary schools**

Analysis of Variance in competence of soybean among the three schools sampled shown in Table 6 reveals no significant difference in the level of soybean competence among the students in the schools. This result suggests that the students had comparative equal level of exposure to soybean processing, which could have influenced the same level of competence found among the students across the adopted secondary school in the city metropolis.

## **CONCLUSION**

The study concludes that majority of the secondary school students in IAR&T adopted secondary schools engaged in soybean processing are female. Most of the parents of the respondents attained secondary education and are engaged in petty trading. Majority attested to the improvement of the nutritional status of children who feed on it as the knowledge of the benefit of soybean. Overall, the respondents' knowledge of utilization was high. Soymilk processing ranked highest with respect to the level of competence as product of soybean. Significant relationship existed between gender and competence in soybean processing. Educational attainment of the respondent's mother and the student's knowledge of the benefits of soybean contributed to the level of competence in soybean processing.

From the foregoing, it is recommended that:

1. Soymilk processing should be the baseline for any training on soybean processing for other products in secondary schools;
2. Trainings with respect to processing of soybean should give more attention to the male gender so as to balance the knowledge deficit and efforts should be made to ensure that more girls are in school to help the future generation.

## **ACKNOWLEDGEMENTS**

The authors wish to acknowledge the management and staff of Institute of Agricultural Research and Training (IAR&T), Ibadan for support received during the training of secondary school students and during data collection.



**Table 1: Distribution of student based on their personal characteristics (n=203)**

<b>Variables</b>	<b>Categories</b>	<b>Frequencies</b>	<b>Percentages</b>	<b>Mean</b>
<b>Age</b>	14	34	16.7	15.88± 1.27
	15	46	22.7	
	16	56	27.6	
	17	50	24.6	
	18	13	6.4	
	19	3	1.5	
<b>Gender</b>	20	1	0.5	
	Female	117	57.6	
<b>Class</b>	Male	86	42.4	
	Ss1	57	28.1	
	Ss2	104	51.2	
<b>School</b>	Ss3	42	20.7	
	United secondary school Ijokodo	80	39.4	
	United Christian School Omi- Adio	64	31.5	
<b>Father's education</b>	IMG	59	29.1	
	No education	13	5.9	
	Primary education	15	7.4	
	Secondary education	100	49.3	
<b>Mother's education</b>	Tertiary education	76	37.4	
	No education	12	5.9	
	Primary education	18	8.9	
	Secondary education	116	57.1	
<b>Father's major occupation</b>	Tertiary education	57	28.1	
	Artisan	51	25.1	
	Farming	20	9.9	
	Clergy	8	3.9	
	Petty trading	76	37.4	
<b>Mother's major occupation</b>	Civil service	48	23.6	
	Artisan	36	17.7	
	Farming	5	2.5	
	Clergy	4	2.6	
	Petty trading	127	62.6	
	Civil service	31	15.3	

Source: Data collection, 2017

**Table 2(a): Distribution of student according to their Knowledge of benefit of soybean**

S/No	Knowledge statements	Yes	No
1.	Soybean can improve the nutritional status of children fed with it	192(94.6)	11(5.4)
2.	Soybean is not as rich in protein as animal meat	63(31.0)	140(69.0)
3.	Soybean has solution to malnutrition in both adult and children	175(86.2)	28(13.8)
4.	Micro-nutrient that is mostly deficient in other foods cannot be supplied by soybean	78(38.4)	125(61.6)
5.	Soybean contains more dangerous fat in food	35(17.2)	168(82.7)
6.	Soybean products could be used as animal protein substitute in human diets	162(79.8)	41(20.2)
7.	Soybean is not only good for children but also for the adults	127(62.6)	76(37.4)
8.	Soybean is not good for pregnant women	151(74.4)	52(25.6)
9.	Soybean intake can reduce the occurrence of low birth weight among pregnant women	74(36.5)	129(63.5)
10.	It can prevent massive number of infants and child death	119(58.6)	84(42.4)

Source: Data collection, 2017

**Table 2(b): Categorization of students' knowledge of benefit of soybean**

Categorization	Score	Frequency	%
High	17 – 20	130	64
Low	12 – 16	73	36

Min- 12.0, Max – 20.0, Mean – 17.0±1.66



**Table 3: Distribution of respondents according to their level of competence in soybean processing**

S/No	Products of soybean	High competence	Average competence	Low competence	No competence	Mean	Rank
I.	Soy milk	67(33.0)	14(6.9)	44(21.7)	78(38.4)	2.34	1 <sup>st</sup>
II.	Soy akara	19(9.4)	24(11.8)	21(10.3)	139(68.5)	1.62	3 <sup>rd</sup>
III.	Soy cheese	13(6.4)	23(11.3)	13(6.4)	154(75.9)	1.48	7 <sup>th</sup>
IV.	Soy moinmoin	16(7.9)	31(15.3)	8(3.9)	148(72.9)	1.58	6 <sup>th</sup>
V.	Dadawa	10(4.9)	15(7.4)	14(6.9)	164(80.8)	1.36	12 <sup>th</sup>
VI.	Soy vegetable soup	22(10.8)	8(3.9)	12(5.9)	161(79.3)	1.46	8 <sup>th</sup>
VII.	Soy meat	19(9.4)	11(5.4)	10(4.9)	163(80.3)	1.44	9 <sup>th</sup>
VIII.	Soybean coffee	14(6.9)	18(8.9)	11(5.4)	160(78.8)	1.44	9 <sup>th</sup>
IX.	Soy flour	26(12.8)	16(7.9)	9(4.4)	152(74.9)	1.59	5 <sup>th</sup>
X.	Soy yogurt	29(14.3)	22(10.8)	11(5.4)	141(69.5)	1.70	2 <sup>nd</sup>
XI.	Soygari	11(5.4)	15(7.4)	18(8.9)	159(78.3)	1.40	11 <sup>th</sup>
XII.	Soy-ogi	26(12.8)	16(7.9)	11(5.4)	150(73.9)	1.60	4 <sup>th</sup>

- Source: Data collection, 2018
- Figures in brackets are percentages

**Table 4: Relationship between the socio-economic characteristics of students and their competence in soybean processing**

Variable	$\chi^2$	R	Df	P
Gender	17.71		1	0.000**
Age		-0.006		0.932
Father's education	1.34		3	0.720
Mother's education	5.93		3	0.115
Father's major occupation	0.73		4	0.947
Mother's major occupation	2.112		4	0.715
School	9.001		2	0.011*
Class of student	20.26		2	0.001**

\*- significant at 5% \*\*- significant at 1%

**Table 5: Contributions of some variables to level of competence in soybean processing among secondary school students**

Variables	Beta	T	sig	Remark
Age of students	-0.33	-0.438	0.662	NS
Education of father	0.076	0.882	0.379	NS
Education of mother	0.650	0.781	0.043	S
Father's major occupation	-0.020	-0.263	0.793	NS
Mother's major occupation	-0.005	-0.066	0.947	NS
Knowledge; benefit of soybean	0.422	6.413	0.000	S

Adjusted R<sup>2</sup>- 0.549, Standard error- 7.47

**Table 6: Analysis of the difference in the level of competence in soybean processing among the schools**

Groups	Sum of squares	df	Mean square	F	sig
Between groups	309.109	2	154.554	2.389	0.094
Within groups	12937.433	200	64.687		
Total	13246.542	202			



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