IMPACT OF DIGITALIZATION ON PUBLIC DISTRIBUTION SYSYTEM IN ACHIEVING THE UNITED NATION'S SUSTAINABLE DEVELOPMENT GOAL OF ZERO HUNGER

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Abstract: This paper seeks to examine the role of Digitalized PDS in achieving the zero-hunger goal of united nation which is set up to be achieved by 2030. This study also analyses the awareness of public regarding the digitalization of PDS and the overall development of poor families, as a result of the ICT initiatives like installation of e-Pos machines, Aadhar linked Ration Cards etc…., by increasing the transparency of commodity's delivery process. Finally, this paper studies the benefits and drawbacks of digitalized PDS. Our study reveals that there is a positive relation between Digitalized PDS and Zero-Hunger.

Index Terms - Sustainability, poverty, Fair price shop, Zero hunger economy, Food Security.

I. INTRODUCTION

The Indian food security system was introduced by government of India under the ministry of consumer affairs, food and public distribution in 1944. Major commodities like sugar, kerosene, rice was distributed through the ration shops organised in various places. Central and state government actively controls this network. The civil service department discharges the important responsibility for its enforcement and it ensure proper distribution of food grains at the price fixed by the government. Ration shops are now present in almost all the areas and one must have a ration card to buy these commodities. The commodities provided by these fair shops are not enough to meet the requirements of poor people. Sustainable development by eradicating poverty is a mandatory requirement in this present scenario. Here, sustainable development means meeting human development goals without any harm to our environment and reducing corruption. The newly implemented 2030 agenda by United Nations for sustainable development holds a deep promise for a zero-hunger generation. Public Distribution system also plays a vital role in achieving this sustainable development. It has undergone a great development during the last decades. The Government has successfully brought about significant changes through this PDS reforms. As a part of the implementation of National Food Security Act, almost all states have taken on PDS reforms. Digitalization of PDS and its application contributes a lot to eradication of poverty. Government has introduced Revamped public distribution system, e-Pos machines, Anthyodaya Annayogana, different price levels for APL and BPL cardholders etc. it is very familiar that Kerala had one of the first and fruitful PDS networks in India. The noticeable features are its universal coverage, high level of physical access. The main drawback of this system is low quality of grains and black marketing, But the digitalization of PDS helps to solve this problem to a great extent. It is mandatory to analyse the digitalized Public Distribution System and its effectiveness. In this study we inquire into the reforms adopted by PDS and its role and impact in ensuring zero hunger.

II. OBJECTIVES AND METHODOLOGY OF THE STUDY

➢ Objectives
1. To identify the role of digitalization in achieving zero hunger.
2. To analyse the awareness of public regarding the digitalization of PDS.
3. To draw a light on the overall development of poor families as a result of the recent reforms in PDS.
4. To study about the various benefits and limitations of digitalizing the PDS.

➢ Methodology of the study
Primary as well as secondary data are used for acquiring facts. Primary data are collected with the help of sample survey by using interview schedule. Secondary data will be collected from various publications of the Central, State and Local governments, books, magazines, newspapers, public records, historical documents, and also referring to the website. The statistical tools like bar chart, pie chart, line chart, tables and spss are used to justify the study.

III. REVIEW OF LITERATURE AND DATA ANALYSIS.

(Maya Ganesh, 2019) Diversion of subsidized goods for private gain is common experience worldwide. Implementation of digital technologies can reduce the rate of diversions. This paper studies about the effect of using e- Pos devices in ensuring food security. This helps in distribution of the grains to genuine beneficiaries. It helps in better monitoring by the authorities.

(Maseiro, 2017) **So**cial Protection Programs for the poor are being digitalized in global scale using the biometric recognition techniques. This study helps us to gain more information on the effects of digitalization on the anti-poverty system in the state of Kerala. This study reveals the advantages of using computerized recognition of its users in India's Public Distribution System. It concluded that biometric technology is a powerful weapon against diversion of PDs goods on the market. It also brings in efficiency and prevents leakages.

(Gogoi, 2017)According to the study conducted by Ananya and himadree the objectives of the study are to find out where there is any illegal activities happening in the PDS system and to find out the complaints of the customers regarding PDS. The study has found out that the food grains supplied to the people are of poor quality. They also find out that people are cheated by the ration shop owners they are charging high price on the food grains from the customers and unfair practices are also going on the PDS shops.

(Dr, 2017) They had analysed the distribution of food grains through PDS in Kerala and Kottayam district. Their analysis had found out that PDS is a good system that result in marginalization of the weaker sections of the society. Their study analysis the distribution of rice, kerosene, and sugar in Kerala and Kottayam District. Their findings have both increasing and decreasing trend. Their study reveals that people are ready to buy whatever government provide through PDS.

(Panchayat, 2017) conducts a study on the effectiveness of Public Distribution System in Kerala. They conducted that the Public Distribution System has been one of the most important elements in India's safety system for almost 50 years. Their study shows that most of the people prefer this Public Distribution System for meeting their food requirements. It reveals the role of PDS in welfare promotion.

3.1 Demographic profile of the card holders

Table 3.1.1 Age

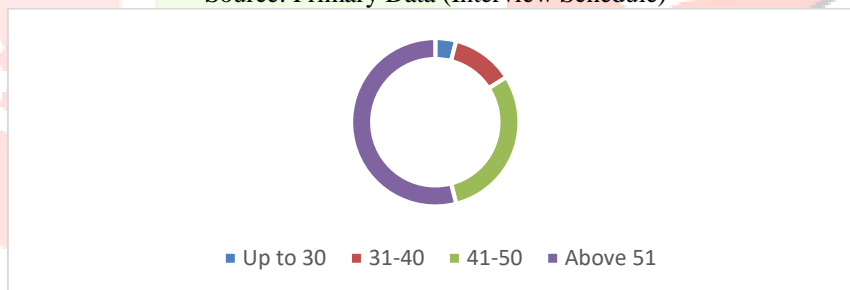| Age	No of Respondents	Percentage
Up to 30	2	4
31-40	6	12
41-50	15	30
Above 51	27	54
Total	50	100

Source: Primary Data (Interview Schedule)

Figure 3.1.1 Age

The table and figure 3.1.1 shows that out of 50 respondents, more than half of them belongs to above 51 category of age, 30% belongs to 41-50 age, 12% belongs to 31-40 and 4% belongs to up to 30 category. This indicate that young respondents are less.

Table 3.1.2 Gender

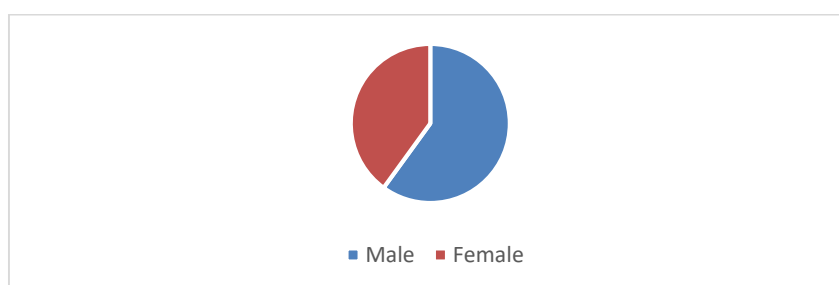| Gender	No of Respondents	Percentage
Male	20	40
Female	30	60
Total	50	100

Source: Primary Data (Interview Schedule)

Figure 3.1.1 Age

The sample of 50 respondents consist of 60% females and 40% males and is shown in Table and figure 3.1.2. An attempt was made to get a fair opinion of both males and females.

Table 3.1.3 Occupation

Occupation	No of Respondents	Percentage
Govt Employee	9	18
Private Employee	9	18
Farmer	9	18
Business Man	7	14
Daily Wages	12	24
No work	4	8
Total	50	100

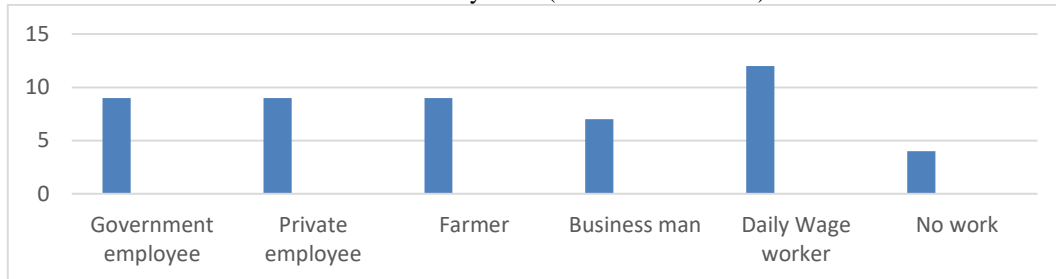Source: Primary Data (Interview schedule)

Fig 3.1.3 Occupation

The above figure 3.1.3 shows the clustered column analysis of the occupation of respondents. majority of the respondents i.e. 24 % are daily wage workers. 18% of them are government employees, 18% of them are private employees,18% of them are farmers and 7% of the respondents deal with business and only 4% of them are not working.

Table 3.1.4 Monthly Income

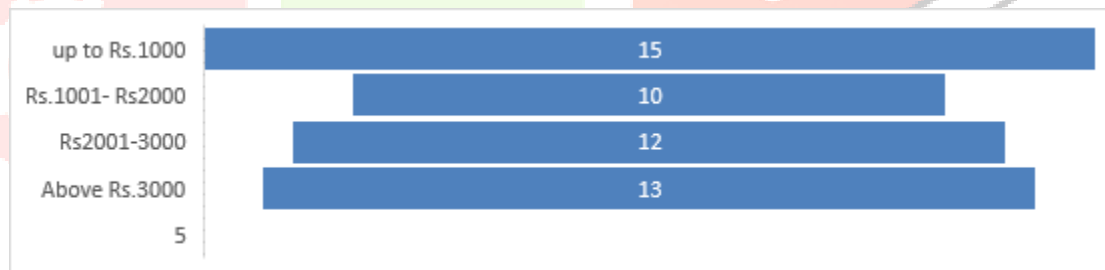| Monthly Income	No of Respondents	Percentage
Up to Rs 1000	15	30
1001-2000	10	20
2001-3000	12	24
Above 3000	13	26
Total	50	100

Source: Primary Data (interview schedule)

Fig 3.1.4 monthly Income

From the total respondents 15 have monthly salary up to Rs.1000 i.e. 30%, 10 of them have salary from Rs.1001-Rs. 2000 i.e. 20%, 24% i.e. 12 of them have salary from Rs. 2001- Rs. 3000 and 13 of them i.e. 26% have salary above Rs. 3000 per month. It shows that majority of them belongs to the lower income group. There is a huge difference between the total income.

3.2 Testing of Hypothesis

The testing includes awareness level of consumers with Gender, Age, income and occupation. For this, t-test as well as Anova test is used.

3.2.1 Awareness level of consumers with Gender

In order to test whether there is any significant difference among gender with regards to awareness level of consumers, the following hypothesis are formulated.

H_0: There is no significant differences between awareness of public regarding digitalization of PDS among the gender of consumer.

H_1: There is significant differences between awareness of public regarding digitalization of PDS among the gender of consumer.

Table 3.2.1 Relationship between awareness level of consumers and Gender – Result of t-test

Gender	Mean	Std Dev	Sig	T	df	Sig.tailed
Male	17.6000	4.62715	.101	1.813	48	0.076
Female	15.5667	3.30812		1.697	31.790	0.09

Table 3.2.1 shows the result of t-test. The p value at 5% significance is more than 0.05, therefore the null hypothesis is accepted and there exist no significant relation in awareness of digitalization of PDS among Male and Female.

3.2.2 Awareness level of consumers by Age

In order to test whether there is any significant difference between Age and awareness level of consumers, the following hypothesis are formulated.

H_0: There is no significant differences between awareness of public regarding digitalization of PDS and age.

H_1: There is significant differences between awareness of public regarding digitalization of PDS and the age.

Table3.2.2 Relationship between awareness level of consumers and Age Group – Result of Anova test

	Sum of squares	Df	Mean Square	F	Sig
Between groups	96.471	3	32.157	2.184	0.103
Within groups	677.309	46	14.724		
Total	773.780	49			

Table 3.2.2 shows the result of anova test. The p value at 5% significance is more than 0.05, therefore the null hypothesis is accepted and there exist no significant relation in awareness of digitalization of PDS with Age Group.

In order to test whether there is any significant difference between occupation and awareness level of consumers, the following hypothesis are formulated.

3.2.3 Awareness level of consumers by Occupation.

H_0: There is no significant differences between awareness of public regarding digitalization of PDS and occupation.

H_1: There is significant differences between awareness of public regarding digitalization of PDS and the occupation.

Table 3.2.3 Relationship between awareness level of consumers and occupation- Result of Anova test

	Sum of squares	Df	Mean Square	F	Sig
Between groups	59.927	5	11.985	0.739	0.599
Within groups	713.853	44	16.224		
Total	773.780	49			

Table 3.2.3 shows the result of anova test. The p value at 5% significance is more than 0.05, therefore the null hypothesis is accepted and there exist no significant relation in awareness of digitalization of PDS with their occupation.

3.2.3 Awareness level of consumers by Income.

In order to test whether there is any significant difference between income and awareness level of consumers, the following hypothesis are formulated.

H_0: There is no significant differences between awareness of public regarding digitalization of PDS and income.

H_1: There is significant differences between awareness of public regarding digitalization of PDS and the income.

Table 3.2.4 Relationship between awareness level of consumers and income- Result of Anova test

	Sum of squares	Df	Mean Square	F	Sig
Between groups	160.773	3	53.591	4.021	.013
Within groups	613.007	46	13.326		
Total	773.780	49			

Table 3.2.4 shows the result of anova test. The p value at 5% significance is less than 0.05, therefore the null hypothesis is rejected and there exist significant relation in awareness of digitalization of PDS with their Income.

3.2.5 Benefits of PDS among Gender.

In order to test whether there is any significant difference between Benefits of PDS and Gender, the following hypothesis are formulated

H_0: There is no significant differences between Benefits of PDS and Gender

H_1: There is significant differences between Benefits of PDS and Gender

Table 3.2.5 Relationship between Benefits of PDS among Gender Result of t-test.

Gender	Mean	Std Dev	Sig	T	df	Sig.tailed
Male	26.3500	6.02866	0.7720	0.354	48	0.725
Female	25.7333	6.03400		0.354	40.901	0.725

Table 3.2.5 shows the result of t- test. The p value at 5% significance is more than 0.05, therefore the null hypothesis is accepted and there exist no significant relation in Benefits of PDS among Genders.

3.2.6 Benefits of PDS among Age.

In order to test whether there is any significant difference between Benefits of PDS with Age group, the following hypothesis are formulated

H_0: There is no significant differences between Benefits of PDS with Age group.

H_1: There is significant differences between Benefits of PDS with Age group.

Table 3.2.6 Relationship between Benefits of PDS among Age group- Result of Anova test

	Sum of squares	Df	Mean Square	F	Sig
Between groups	125.243	3	41.748	1.181	0.327
Within groups	1625.737	46	35.342		
Total	1750.980	49			

Table 3.2.6 shows the result of anova. The p value at 5% significance is more than 0.05, therefore the null hypothesis is accepted and there exist no significant relation in Benefits of PDS with age group.

3.2.7 Benefits of PDS among Income.

In order to test whether there is any significant difference between Benefits of PDS with monthly income, the following hypothesis are formulated

H_0: There is no significant differences between Benefits of PDS with monthly income.

H_1: There is significant differences between Benefits of PDS with monthly income.

Table 3.2.7 Relationship between Benefits of PDS with monthly income- Result of Anova test

	Sum of squares	Df	Mean Square	F	Sig
Between groups	163.058	3	54.353	1.575	0.208
Within groups	1587.922	46	34.520		
Total	1750.980	49			

Table 3.2.7 shows the result of anova. The p value at 5% significance is more than 0.05, therefore the null hypothesis is accepted and there exist no significant relation in Benefits of PDS with monthly income.

3.2.8 Benefits of PDS with occupation

In order to test whether there is any significant difference between Benefits of PDS with occupation, the following hypothesis are formulated

H_0: There is no significant differences between Benefits of PDS with occupation.

H_1: There is significant differences between Benefits of PDS with occupation.

Table 3.2.8 Relationship between Benefits of PDS with occupation- Result of Anova test

	Sum of squares	Df	Mean Square	F	Sig
Between groups	103.374	5	20.675	0.552	0.736
Within groups	1647.606	44	37.446		
Total	1750.980	49			

Table 3.2.8 shows the result of anova. The p value at 5% significance is more than 0.05, therefore the null hypothesis is accepted and there exist no significant relation in Benefits of PDS with monthly income.

3.2.9 Challenges of PDS among Gender

In order to test whether there is any significant difference between Challenges of PDS and Gender, the following hypothesis are formulated

H_0: There is no significant differences between Challenges of PDS and Gender

H_1: There is significant differences between Challenges of PDS and Gender

Table 3.2.9 Relationship between challenges of PDS among gender Result of t-test.

Gender	Mean	Std Dev	Sig	T	Df	Sig.tailed
Male	23.9000	5.00421	0.579	-2.045	48	0.46
Female	26.6333	4.36667		-1.989	36.948	0.054

Table3.2.9 shows the result of t- test. The p value at 5% significance is more than 0.05, therefore the null hypothesis is accepted and there exist no significant relation in challenges of PDS among Genders.

3.2.10 Challenges of PDS with Age

In order to test whether there is any significant difference between Benefits of PDS with Age group, the following hypothesis are formulated

H_0: There is no significant differences between challenges of PDS with Age group.

H_1: There is significant differences between challenges of PDS with Age group.

Table 3.2.10 Relationship between challenges of PDS among Age group- Result of Anova test

	Sum of squares	Df	Mean Square	F	Sig
Between groups	37.329	3	12.443	0.529	0.669
Within groups	1081.091	46	23.502		
Total	1118.420	49			

Table 3.2.10 shows the result of annova. The p value at 5% significance is more than 0.05, therefore the null hypothesis is accepted and there exist no significant relation in challenges of PDS with age group.

3.2.11 Challenges of PDS with monthly income

In order to test whether there is any significant difference between challenges of PDS with monthly income, the following hypothesis are formulated

H_0: There is no significant differences between challenges of PDS with monthly income.

H_1: There is significant differences between challenges of PDS with monthly income.

Table 3.2.11 Relationship between challenges of PDS with monthly income- Result of Anova test

	Sum of squares	Df	Mean Square	F	Sig
Between groups	300.424	3	100.141	5.631	0.002
Within groups	817.996	46	17.783		
Total	1118.420	49			

Table 3.4.11 shows the result of anova. The p value at 5% significance is less than 0.05, therefore the null hypothesis is accepted and there exist significant relation in challenges of PDS with monthly income.

3.2.12 Challenges of PDS with occupation

In order to test whether there is any significant difference between challenges of PDS with occupation, the following hypothesis are formulated

H_0: There is no significant differences between challenges of PDS with occupation.

H_1: There is significant differences between challenges of PDS with occupation.

Table 3.2.12 Relationship between challenges of PDS with occupation- Result of Anova test

	Sum of squares	Df	Mean Square	F	Sig
Between groups	191.564	5	38.313	1.819	0.129
Within groups	926.856	44	21.065		
Total	1118.420	49			

Table 3.4.12 shows the result of anova. The p value at 5% significance is more than 0.05, therefore the null hypothesis is accepted and there exist no significant relation in challenges of PDS with occupation

IV. RESULTS AND DISCUSSION.

IV.(i) RESULTS

Factors influencing the role of digitalization in achieving zero hunger.

- More than half of the respondents i.e.70% agrees that digitalization provides a proper platform to file complaints. Only 16% disagrees with the statement and 14% made a neutral agreement about the same.
- Majority of the respondents i.e. 80% strongly agrees that digitalization reduces manipulations like black marketing, diversion of food grains etc. only 10% disagrees with the statement and 10% made a neutral agreement about this. Here we can conclude that digitalization plays an important role in reducing corruptions.
- Out of total respondents, 34% agrees that digitalization prevents manipulations in weight and measure, 24% have no opinion about this, but 44% strongly disagrees with the same.
- The basis of fixing the ration quota was the size of the family. The greater number of members in a family gives them more amount of food grains. Various manipulations are happening in the ration shops earlier but nowadays after digitalization the frequency of frauds decreased and it is very clear that more than half of the respondents agrees that digitalization helps in allotting adequate quota to the card holders. Various new reforms like e-pos machine, receiving SMS after every purchase etc. helps in this.
- Against the backdrop of theft and waste, more than three-quarters of India's population eats less than the minimum targets set by the government, and the nation is home to one in three of the malnourished children. Digitalization of PDS has changed this situation and it is clear that more than half of the respondents i.e. 62% agrees that digitalization prevents partiality of cardholder to specific people, 11% neutrally made an opinion and only 16% disagrees with the same.
- More than half of the respondents i.e. 52% acknowledged the fact on based on their experience that information through SMS after purchase of grocery match with the quantity purchased. 24% made an average opinion about this and only 24% disagrees with the same. So here we can conclude that the information through SMS is a positive way of reducing all manipulations.
- Nearly 48% of the respondents said that receiving SMS after purchase of grocery will surely lead to a zero-hunger society, but 26% of respondents disagrees with the statement as they are not sure about it and 26% of them made a neutral agreement about this. Receiving SMS after purchasing makes sure that the specified quantities are given to the card holders and several manipulations can be avoided, and here after the enquiry also we can conclude that it is a good step from the part of the government to reduce frauds.

Degree of awareness of public regarding the digitalization of PDS.

- Table 3.4.1 shows the result of t-test. The p value at 5% significance is more than 0.05, therefore the null hypothesis is retained and there exist no significant relation in awareness of digitalization of PDS among Male and Female
- Table 3.4.2 shows the result of anova test. The p value at 5% significance is more than 0.05, therefore the null hypothesis is retained and there exist no significant relation in awareness of digitalization of PDS with Age Group.
- Table 3.4.3 shows the result of anova test. The p value at 5% significance is more than 0.05, therefore the null hypothesis is retained and there exist no significant relation in awareness of digitalization of PDS with their occupation.
- Table 3.4.4shows the result of anova test. The p value at 5% significance is less than 0.05, therefore the null hypothesis is rejected and there exist significant relation in awareness of digitalization of PDS with their occupation.

Reasons for the overall development of poor families as a result of the recent reforms in PDS.

- Among the 50 respondents, 15 agreed and 9 strongly agreed that overall development of poor families is possible through digitalization. But 6 disagreed and 7 strongly disagreed that digitalizion's role in poor family's development.13 cardholders do not have any opinion on this statement.
- Majority i.e. 30% agreed that basic need of food is satisfied through these rationshops.18% strongly agreed whereas 12% strongly disagreed this statement.14% responded a disagreement to the statement and 26% do not have any opinion on this statement.
- Most of the respondents do not have any opinion in PDS improving the living standard of the poor families. Out of the 50 cardholders, 13 agreed and 12 strongly agreed that their living standard has been improved due to services of PDS but 3 respondents strongly and 2 respondents disagreed to this statement.
- Out of 50 respondents 18 do not have any opinion regarding the quantity of grains supplied through PDS.13 are highly and 5 are satisfied with quantity of food grains provided to the needy people whereas 8 respondents are highly dissatisfied and 6 are dissatisfied in the quantity of goods provided through PDS.
- Majority of the respondents are agreeing that unequal distribution of food grains can be reduced through the recent reforms in PDS because it helps in identifying the needy people and diversion of food grains have become impossible.

Overall benefits and challenges of digitalizing of PDS.

- Table 3.2.5 shows the result of t- test. The p value at 5% significance is more than 0.05, therefore the null hypothesis is retained and there exist no significant relation in Benefits of PDS among Genders.
- Table 3.2.6 shows the result of annova. The p value at 5% significance is more than 0.05, therefore the null hypothesis is retained and there exist no significant relation in Benefits of PDS with age group.
- Table 3.2.7 shows the result of annova. The p value at 5% significance is more than 0.05, therefore the null hypothesis is retained and there exist no significant relation in Benefits of PDS with monthly income.
- Table 3.2.8 shows the result of annova. The p value at 5% significance is more than 0.05, therefore the null hypothesis is retained and there exist no significant relation in Benefits of PDS with monthly income.
- Table 3.2.9 shows the result of t- test. The p value at 5% significance is more than 0.05, therefore the null hypothesis is retained and there exist no significant relation in challenges of PDS among Genders.
- Table 3.2.10 shows the result of annova. The p value at 5% significance is more than 0.05, therefore the null hypothesis is retained and there exist no significant relation in challenges of PDS with age group.
- Table 3.2.11 shows the result of annova. The p value at 5% significance is less than 0.05, therefore the null hypothesis is rejected and there exist significant relation in challenges of PDS with monthly income.
- Table 3.2.12 shows the result of annova. The p value at 5% significance is more than 0.05, therefore the null hypothesis is retained and there exist no significant relation in challenges of PDS with occupation

IV (ii)SUGGESTIONS

Based on the study, following suggestions are put forward for the better adoption of Public Distribution system by the government

1. To get more benefit from Public Distribution system, the government should implement greater monitoring and vigilance facilities.
2. Government should try to provide higher quality food grains to the beneficiaries
3. Government authorities must make sure that the ration dealers' approach towards the customers is transparent and fair.
4. There should be proper identification of the beneficiaries and should have a proper system for filing their grievances.

IV (iii)CONCLUSION

Digitalization of Public Distribution System has played a very significant role in ensuring the food security of the country. The use of technology minimized the black marketing, diversion of food grains and corruption to the maximum. This project is conducted to know the role of Public Distribution System in achieving the United Nations Sustainable Development goal of Zero hunger. The technical platforms like SMS, e-Pos machine etc. ensures that right quantity of food grains reached in right hands at the right time. The basic need for food is ensured to every Indian. Thus, the gap between the rich and poor is reduced to a great extent. Public Distribution System has resulted in the overall development of poor families. Availability of adequate food grains in lower price reduced the dependence on open market. The arrogant behaviour of ration dealers is a major difficulty faced by the common people but fortunately there is an active grievance cell functioning for this institution.

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