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A DESIGN OF SPECIAL PURPOSE DOUBLE SAMPLING PLAN OF TYPE $DSP(0,1)$ USING FUZZY PARAMETER

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Abstract: In traditional sampling plan, the proportion defective is generally assumed to be crisp value. But, in real life parameters are vague and assumptions are too rigid. So traditional methods are inaccurate. In this paper Fuzzy set theory is applied to acceptance sampling. A procedure for designing Special Purpose Double Sampling Plan of Type $DSP(0,1)$ using trapezoidal fuzzy number is developed and it is based on fuzzy binomial distribution. The OC curve values are determined using fuzzy parameter while fixing the sample size. Fuzzy probability of acceptance values are calculated for different $\widetilde{AQL}$ and $\widetilde{LQL}$ values and are presented in Tables for the selection of $DSP(0,1)$ Plan. Optimum value of the sample size is obtained such that it satisfies both the condition of producer's risk and consumer's risk for given $\widetilde{AQL}$ and $\widetilde{LQL}$ values. The sample size is obtained such that it minimizes the sum of risks. Numerical examples are provided for the illustrations.

Keywords and Phrases: Statistical quality control, Acceptance Sampling, Operating characteristic (OC) curve, Fuzzy number, Trapezoidal fuzzy number.

2020 Mathematics Subject Classification: 03E72, 06A86,62C86, 62E86.

1. Introduction

Acceptance sampling plans are practical tools for quality assurance applications involving quality contract on product orders and it is important aspects of statistical quality control. For inspection of end items, components, raw materials, operations, materials in process, supplies in storage, maintenance operations, data or records and administrative procedures, acceptance sampling plan can be applied. In acceptance sampling plans the fraction of defective items is considered as a crisp values, but in practice the fraction of defective items value must be known exactly. Many times these values are estimated or it is provided by experiment. The vagueness present in the value of p from personal judgement, experiment or estimation may be treated formally with the help of fuzzy set theory. It is a powerful mathematical tool for modeling uncertainty.

The word "fuzzy" means "vagueness". The occurrence of randomness and imprecise data is unavoidable in real world due to some uncontrollable facts. It provides a strict mathematical framework in which vague concept can be precisely and rigorously studied. The fuzzy set theory was introduced by Zadeh (1965). In certain situation idea about the information is not clear which is quantitatively and qualitatively inappropriate to describe or unable to predict its behaviour. Main causes of uncertainty are lack of information, abundance of information, conflicting evidence, ambiguity, measurement and belief. Fuzzy numbers are great importance in fuzzy systems. It is a very special subset of fuzzy subset of the real numbers.

Bahram et al (2008) analyzed acceptance double sampling plan with fuzzy parameter when the fraction defective is a fuzzy number. Ezzatallah et al (2009) designed acceptance single sampling plan with fuzzy parameter using poisson distribution and result shows that operating characteristic bands are convex with zero acceptance number. Cendiz et al (2010) provides fuzzy acceptance sampling plans for single and double sampling plan assuming fuzzy binomial and fuzzy poisson distribution. The result shows that fuzzy parameter provides more flexibility and usability. Baloui et al (2011) proposed single acceptance sampling plan with fuzzy parameter and explained fuzzy probability theory in single sampling plan. Ezzatallah et al (2012) explains acceptance double sampling plan using fuzzy poisson distribution and operating characteristic curve (OC), Average sample number (ASN), Average total inspection number (ATI), Average outgoing quality (AOQ) were analyzed using fuzzy parameters. Ezzatallah et al (2011) discussed about chain sampling plan using fuzzy probability theory. Ebru et al (2012) provides operating characteristics curves for fuzzy single sampling plan and double sampling plan. Fuzzy parameters were used to explain OC, ASN, ATI, Average outgoing quality limit ($AOQL$).

Afshari et al (2017) designed multiple deferred state sampling plan with fuzzy parameter. Afshari et al (2017) analysed fuzzy multiple deferred state attribute sampling plan in the presence of inspection errors. Muhammad Zahir khan et al

(2019) proposed design of fuzzy sampling plan using the Birnbaum Saubders distribution. Kavi priya and Sudamani Ramaswamy (2021) designed modified chain sampling plan using fuzzy parameter. Kavi priya and Sudamani Ramaswamy (2021) developed two sided modified complete chain sampling plans using fuzzy parameter. Kavi priya and Sudamani Ramaswamy (2022) proposed two sided complete chain sampling plans using fuzzy parameter.

From Cameron (1952) table, one can observe a jump between the operating ratios of $c = 0$ and $c = 1$ and slow reduction of operating ratios for other values of c. It may also be seen that, in between the OC curves of $c = 0$ and $c = 1$ plans, there is a vast gap to be filled which leads one to assess the possibility of designing plans having OC curves lying between the OC curves of $c = 0$ and $c = 1$ plans. To resolve this issue, Hald (1981) and Craig (1981) have proposed double sampling plan with acceptance number zero and one, and rejection number 2. Vijayaraghavan (1990) has presented tables for the selection of $DSP-(0,1)$ plan under poisson and binomial conditions of sampling and also proposed a search procedure for designing $DSP(0,1)$.

This paper is organized as follows with basic definitions of fuzzy set, fuzzy number, γ cut, trapezoidal fuzzy number, operating procedure for Special Purpose Double Sampling Plan of Type $DSP(0,1)$ and its flow chart. Operating Characteristic (OC) Curve values are calculated using fuzzy parameter. The sample size of the proposed plan for the given $\widetilde{AQL}$ and $\widetilde{LQL}$ is determined to satisfy both producer's and consumer's risk. And also the sample size is determined so as to minimize the sum of risks and the results are presented in tables.

2. Definitions

As per Zadeh (1965)

Fuzzy set : "A fuzzy set $\breve{A}$ is defined by $\breve{A} = \{(x, \mu_{A(x)}) : x \in A,\ \mu_{A(x)} \in [0,1]\}$ in the pair $(x, \mu_{A(x)})$ the element x belong to the traditional set A, the element $\mu_{A(x)}$ belong to the interval $[0,1]$ called membership function".

Fuzzy Number : "The fuzzy subset $\breve{A}$ of real line, with membership function $\mu_{\breve{A}} : R \to [0,1]$ is a fuzzy number if and only if (i) $\breve{A}$ is normal (ii) $\breve{A}$ is fuzzy convex (iii) $\mu_{\breve{A}}$ is upper semi continuous and (iv) $supp\breve{A}$ is bounded".

γ **cut :** "γ cut of fuzzy number $\breve{A}$ is a non -fuzzy set defined as $A[\gamma] = \{x \in R; \mu_{A(x)} \geq \gamma\}$ hence $A[\gamma] = [A^L_\gamma, A^U_\gamma]$ where $A^L_\gamma = \inf\{x \in R; \mu_{A(x)} \geq \gamma\}$ $A^U_\gamma = \sup\{x \in R; \mu_{A(x)} \geq \gamma\}$".

Trapezoidal fuzzy number : "A trapezoidal fuzzy number $\breve{A}$ is fuzzy number whose membership function defined by four values, $a_1 < a_2 \leq a_3 < a_4$ where the base of the trapezoid is the interval $[a_1, a_4]$ and its top boundary is the line segment $[a_2, a_3]$ hence we may write its membership function $\mu_{\breve{A}}$ as follows

$$\mu_{\breve{A}} = \begin{cases} 0, & x < a_1 \\ \dfrac{x - a_1}{a_2 - a_1}, & a_1 \leq x < a_2 \\ 1, & a_2 \leq x \leq a_3 \\ \dfrac{a_4 - x}{a_4 - a_3}, & a_3 < x \leq a_4 \\ 1, & a_4 < x \end{cases}$$

If trapezoidal fuzzy numbers (TrFNs) are $\breve{A} = (a_1, a_2, a_3, a_4)$, the interval of confidence defined by γ cuts can be written as follows"

$$\breve{A}[\gamma] = [a_1 + (a_2 - a_1)\gamma, a_4 - (a_4 - a_3)\gamma]$$

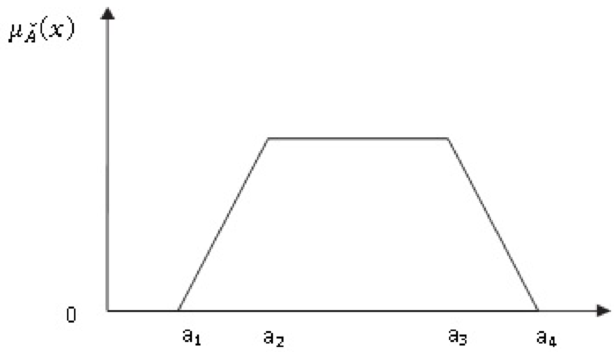


Figure 1: Trapezoidal fuzzy number

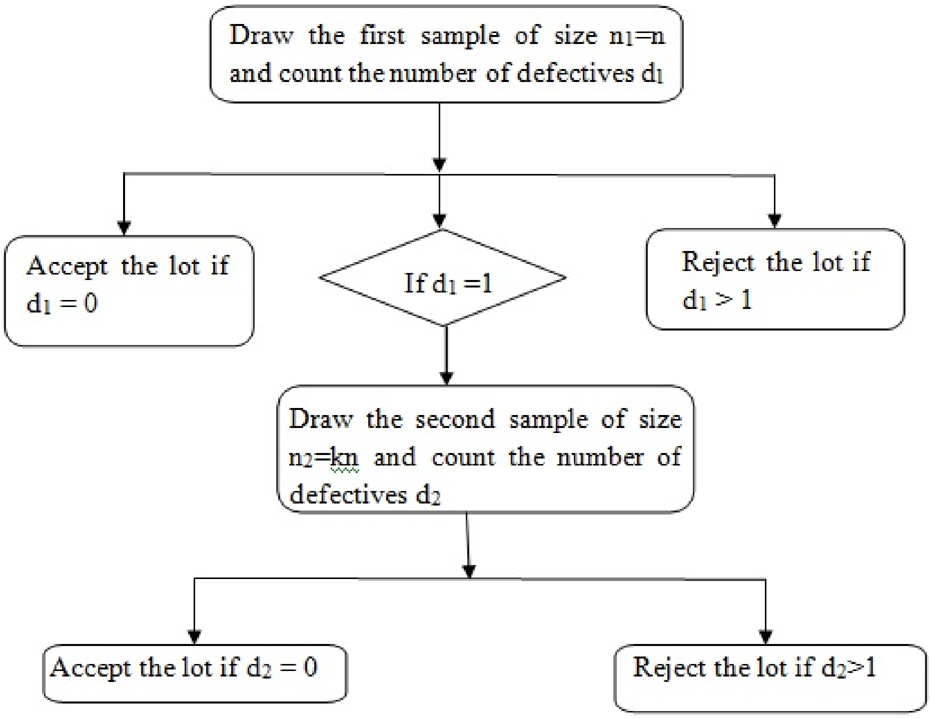
3. Operating Procedure for Special Purpose Double Sampling Plan of Type $DSP(0, 1)$

According to Hald (1981) and Craig (1981) the operating procedure for DSP(0,1) plan is as follows

Step 1: From a lot, select a sample size $n_1 = n$ and observe the number of defectives d_1. Suppose if $d_1 = 0$ accept the lot otherwise (i.e) $d_1 > 1$ reject the lot.

Step 2: If $d_1 = 1$,select a second sample of size n_2 where $n_2 = kn_1(k > 0)$ and observe d_2 value; if $d_2 = 0$ accept the lot otherwise reject the lot.

Flow chart for $DSP(0,1)$ plan



4. Fuzzy Probability of Acceptance

Fuzzy probability of acceptance is calculated using fuzzy binomial distribution. γ cut of trapezoidal fuzzy number is used to solve $DSP(0,1)$ plan such that $\breve{p}[\gamma] = [a_1 + (a_2 - a_1)\gamma, a_4 - (a_4 - a_3)\gamma]$ and taking $\gamma = 0, 1$ then we get fuzzy interval of proportion defective $\breve{p}[\gamma] = [\widetilde{p^L}, \widetilde{p^U}]$ and interval value of fuzzy probability of acceptance $P_a(\widetilde{A})[\gamma] = [\widetilde{p_a^L(p)}, \widetilde{p_a^U(p)}]$.

Consider $\widetilde{p} = (a_1, a_2, a_3, a_4)$ is written as $\widetilde{p_s} = (s, b_2 + s, b_3 + s, b_4 + s)$ and $\widetilde{p_s} \in \widetilde{p_s}[\gamma]$ $\widetilde{q_s} \in \widetilde{q_s}[\gamma]$ and $\widetilde{p_s} + \widetilde{q_s} = 1$. Where $b_i = a_i - a_1$, $i = 2, 3, 4$ and $s \in [0, 1 - b_4]$. γ cuts of trapezoidal fuzzy number to find fuzzy operating characteristic curve where $\gamma = 0$ and $\gamma = 1$. $\widetilde{p_s}[\gamma] = [\widetilde{p_s^L}[\gamma], \widetilde{p_s^U}[\gamma]] = [s + b_2\gamma, b_4 + s - (b_4 - b_3)\gamma]$

$$\widetilde{p_s(B)}[\gamma] = [\widetilde{p_s^L}[\gamma], \widetilde{p_s^U}[\gamma]]$$
$$\widetilde{p_s^L}[\gamma] = \min\{(1 - \breve{p})^n + n\breve{p}(1 - \breve{p})^{(n(k+1)-1)}\}$$
$$\widetilde{p_s^U}[\gamma] = \max\{(1 - \breve{p})^n + n\breve{p}(1 - \breve{p})^{(n(k+1)-1)}\}$$

The fuzzy probability of acceptance calculated for various values of the fuzzy proportion of defective and is provided in Table 1.

Table 1 Fuzzy probability of acceptance with n=20 and k=2

$\breve{p}_s = (s, b_2, b_3, b_4)$	$\breve{p}_s[\gamma = 0]$	$\widetilde{P_{as}}[\gamma = 0]$	$\breve{p}_s[\gamma = 1]$	$\widetilde{P_{as}}[\gamma = 1]$
(0.000, 0.001, 0.002, 0.003)	[0.000 , 0.003]	[1.0000, 0.9770]	[0.001, 0.002]	[0.9971 , 0.9892]
(0.001, 0.002, 0.003, 0.004)	[0.001 , 0.004]	[0.9971, 0.9614]	[0.002 , 0.003]	[0.9892 , 0.9770]
(0.002, 0.003, 0.004, 0.005)	[0.002 , 0.005]	[0.9892, 0.9430]	[0.003 , 0.004]	[0.9770 , 0.9614]
(0.003, 0.004, 0.005, 0.006)	[0.003 , 0.006]	[0.9770, 0.9224]	[0.004 , 0.005]	[0.9614 , 0.9430]
(0.004, 0.005, 0.006, 0.007)	[0.004 , 0.007]	[0.9614, 0.9000]	[0.005 ,0.006]	[0.9430 , 0.9224]
(0.005, 0.006, 0.007, 0.008)	[0.005 , 0.008]	[0.9430, 0.8764]	[0.006 , 0.007]	[0.9224 , 0.9000]
(0.006, 0.007, 0.008, 0.009)	[0.006 , 0.009]	[0.9224, 0.8518]	[0.007 , 0.008]	[0.9000 , 0.8764]
(0.007, 0.008, 0.009, 0.010)	[0.007 , 0.010]	[0.9000, 0.8265]	[0.008 , 0.009]	[0.8764 , 0.8518]
(0.008, 0.009, 0.010, 0.011)	[0.008 , 0.011]	[0.8764, 0.8009]	[0.009 , 0.010]	[0.8518 , 0.8265]
(0.009, 0.010, 0.011, 0.012)	[0.009 , 0.012]	[0.8518, 0.7750]	[0.010 , 0.011]	[0.8265 , 0.8009]
(0.010, 0.011, 0.012, 0.013)	[0.010 , 0.013]	[0.8265, 0.7492]	[0.011 , 0.012]	[0.8009 , 0.7750]
(0.011, 0.012, 0.013, 0.014)	[0.011 , 0.014]	[0.8009, 0.7236]	[0.012 , 0.013]	[0.7750 , 0.7492]
(0.012, 0.013, 0.014, 0.015)	[0.012 , 0.015]	[0.7750, 0.6982]	[0.013 ,0.014]	[0.7492 , 0.7236]
(0.013, 0.014, 0.015, 0.016)	[0.013 , 0.016]	[0.7492, 0.6733]	[0.014 , 0.015]	[0.7236 , 0.6982]
(0.014, 0.015, 0.016, 0.017)	[0.014 , 0.017]	[0.7236, 0.6488]	[0.015 , 0.016]	[0.6982 , 0.6733]
(0.015, 0.016, 0.017, 0.018)	[0.015 , 0.018]	[0.6982, 0.6248]	[0.016 , 0.017]	[0.6733 , 0.6488]
(0.016, 0.017, 0.018, 0.019)	[0.016 , 0.019]	[0.6733, 0.6014]	[0.017 , 0.018]	[0.6488 , 0.6248]
(0.017, 0.018, 0.019, 0.020)	[0.017 , 0.020]	[0.6488, 0.5787]	[0.018 , 0.019]	[0.6248 , 0.6014]
(0.018, 0.019, 0.020, 0.021)	[0.018 , 0.021]	[0.6248, 0.5787]	[0.019 , 0.020]	[0.6014 , 0.5787]
(0.019, 0.020, 0.021, 0.022)	[0.019 , 0.022]	[0.6014, 0.5352]	[0.020 , 0.021]	[0.5787 , 0.5566]

From the Table 1,one can observe that when the parameter 's' value is very small or nearer to zero then the fuzzy probability of acceptance approximately equal to unity.

4. Real life Application

A fruit shop keeper went to buy boxes of kamala orange from whole sale shop in market. Before buying he inspects the fruits box using $DSP - (0, 1)$ plan. Consider $\breve{p}_s = (0.005, 0.006, 0.007, 0.008)$ as fuzzy number, sample size $n_1 = n = 10$, acceptance numbers is in the middle of 0 and 1. Count the number of defective (d_1). If defective fruits in a box is equal to zero, then accept the lot. If defective (d_1) is greater than one, then reject the lot of the fruit box.

If number defective fruit (d_1) is equal to one then select second sample of size $n_2 = kn_1 = 2 \times 10 = 20$ where $(k > 0)$. If defective (d_2) is equal to zero, accept the lot. Suppose if defective (d_2) is greater than one, then reject the lot of the fruit box.

Example 1. For the above real life application, Then γ cut of trapezoidal fuzzy number is used to get for $\gamma = 0$ Fuzzy probability of acceptance as $\breve{p_{as}}[\gamma = 0] = [0.94300.8764]$ and for $\gamma = 1$ FPA as $\breve{P}_{as}[\gamma = 1] = [0.92240.9000]$.

5. Fuzzy Operating characteristic (FOC) curve

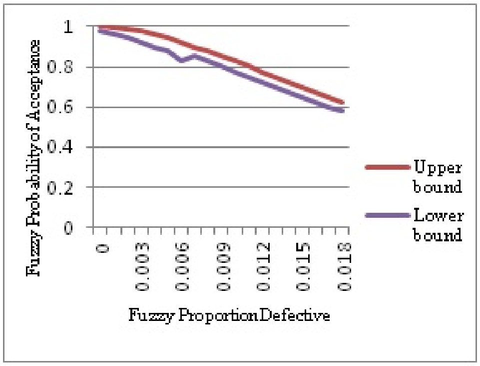


Figure 2: FOC Curve for DSP (0,1) plan when $\gamma = 0$

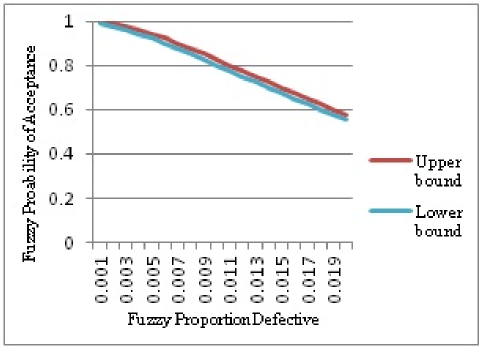


Figure 3: FOC Curve for DSP (0,1) plan when $\gamma = 1$

In acceptance sampling plan very important measure involved is operating characteristic curve (OC curve). It is very effective in reducing risk of the selection plans. OC Curve has upper bound as well as lower bound so we call it as Fuzzy Operating Characteristic (FOC) Curve. FOC curve is used to determine whether to accept the lot or reject the lot. The FOC curve helps to compare efficiency of different plans. From the above Figures, Fuzzy proportion defective is plotted against the Fuzzy probability of acceptance for $\gamma = 0$ and $\gamma = 1$. When γ value increases from 0 to 1, one can observe that FOC curve value becomes closer.

6. Fuzzy probability of acceptance when sample size varies

Table 2. Fuzzy probability of acceptance when sample size varies

n	$\breve{P}_{as}[\gamma = 0]$	$\breve{P}_{as}[\gamma = 1]$
50	$[0.8267, 0.9790]$	$[0.8625, 0.8963]$
45	$[0.8519, 0.9827]$	$[0.8833, 0.9130]$
40	$[0.8764, 0.9861]$	$[0.9033, 0.9285]$
35	$[0.9000, 0.9892]$	$[0.9224, 0.9430]$
30	$[0.9224, 0.9919]$	$[0.9402, 0.9564]$
25	$[0.9430, 0.9943]$	$[0.9564, 0.9865]$
20	$[0.9614, 0.9963]$	$[0.9707, 0.9790]$
15	$[0.9771, 0.9979]$	$[0.9827, 0.9877]$
10	$[0.9893, 0.9991]$	$[0.9920, 0.9943]$
5	$[0.9972, 0.9998]$	$[0.9979, 0.9986]$

Let us assume that $\breve{p}_s = (0.002, 0.003, 0.004, 0.005)$ and the sample size n varies from 5 to 50 then γ cut of trapezoidal fuzzy number is used to calculate the interval of fuzzy proportion defective $\breve{p}_s[\gamma = 0] = [0.0020.007]$, $\breve{p}_s[\gamma = 1] = [0.0050.006]$ and fuzzy probability of acceptance values as shown in the Table 2. When the sample size values decreases the width of FOC curve decreases.

7. Determination of sample size

Let producer's risk $\breve{\alpha}$ and consumer's risk $\breve{\beta}$ relates to acceptance sampling plan. The rejecting the good lot is called producer's risk and accepting the bad lot is called Consumer's risk. Accepting quality level $(\widetilde{AQL})$ as $\breve{p}_1$ and Limiting quality level $(\widetilde{LQL})$ as $\breve{p}_2$. Here Special Purposes Double Sampling Plan of Type $DSP(0, 1)$ is used to design the parameter sample size n to satisfy the following two inequalities for $\breve{P}_a(\breve{p}_1)$ and $\breve{P}_a(\breve{p}_2)$ simultaneously.

$\breve{P}_a(\breve{p}_1) \geq 1 - \breve{\alpha}$ and $\breve{P}_a(\breve{p}_2) \leq \breve{\beta}$ $\breve{\alpha} = 0.05$ and $\breve{\beta} = 0.10$ is fixed so that the interval of fuzzy probability of acceptance is satisfied the conditions $\breve{P}_a(\breve{p}_1) \geq 0.95$ and $\breve{P}_a(\breve{p}_2) \leq 0.10$ for different sample sizes.

$$\breve{P}_a(\breve{p}_1) = (1 - \widetilde{p_1})^n + n\widetilde{p_1}(1 - \widetilde{p_1})^{(n(k+1)-1)} \geq 0.95$$
$$\breve{P}_a(\breve{p}_2) = (1 - \widetilde{p_2})^n + n\widetilde{p_2}(1 - \widetilde{p_2})^{(n(k+1)-1)} \leq 0.10$$

Table 3. Optimum parameter n, when $\breve{P}_a(\breve{p}_1) \geq 0.95$ and $\breve{P}_a(\breve{p}_2) \leq 0.10$

$(\widetilde{AQL})$	$(\widetilde{LQL})$	n
(0.001, 0.0011, 0.0012, 0.0013)	(0.04, 0.041, 0.042, 0.043)	118
	(0.05, 0.051, 0.052, 0.053)	110
	(0.06, 0.061, 0.062, 0.063)	95
	(0.07.0.071, 0.072, 0.073)	71
(0.002, 0.0021, 0.0022, 0.0023)	(0.04, 0.041, 0.042, 0.043)	55
	(0.05, 0.051, 0.052, 0.053)	72
	(0.06, 0.061, 0.062, 0.063)	70
	(0.07.0.071, 0.072, 0.073)	63
(0.003, 0.0031, 0.0032, 0.0033)	(0.04, 0.041, 0.042, 0.043)	49
	(0.05, 0.051, 0.052, 0.053)	45
	(0.06, 0.061, 0.062, 0.063)	48
	(0.07.0.071, 0.072, 0.073)	45
(0.004, 0.0041, 0.0042, 0.0043)	(0.05, 0.051, 0.052, 0.053)	36
	(0.06, 0.061, 0.062, 0.063)	37
	(0.07.0.071, 0.072, 0.073)	35
(0.005, 0.0051, 0.0052, 0.0053)	(0.06, 0.061, 0.062, 0.063)	27
	(0.07.0.071, 0.072, 0.073)	30
	(0.08, 0.081, 0.082, 0.083)	27
	(0.09, 0.091, 0.092, 0.093)	27
	(0.10, 0.101, 0.102, 0.103)	26

8. Minimizing the producer's risk and consumer's risk

The sample size is calculated so as to minimize the sum of the risks and it is presented in Table 4. where $\breve{p}_1$ is Accepting quality level and $\breve{p}_2$ is Limiting quality level and the corresponding the probability of acceptance values are $\breve{P}_a(\breve{p}_1)$ and $\breve{P}_a(\breve{p}_2)$. The mathematical expression to minimize the sum of risk is $\breve{\alpha}+\breve{\beta} = 1-\breve{P}_a(\breve{p}_1)+\breve{P}_a(\breve{p}_2)$. The sum of risks is obtained as interval of fuzzy.

$$\begin{aligned}\breve{\alpha}+\breve{\beta} = 1 - \{(1-\widetilde{p_1})^n + n\widetilde{p_1}(1-\widetilde{p_1})^{(n(k+1)-1)}\} \\ +\{(1-\widetilde{p_2})^n + n\widetilde{p_2}(1-\widetilde{p_2})^{(n(k+1)-1)}\}\end{aligned}$$

Table 4. Optimum parameter n and minimum sum of risks When $\breve{\alpha} \cong 0.05$ and $\breve{\beta} \cong 0.10$

n	$\breve{p}_1[\gamma = 0]$	$\breve{P}_a(\breve{p}_1)$	$\breve{p}_2[\gamma = 0]$	$\breve{P}_a(\breve{p}_2)$	$\breve{\alpha}+\breve{\beta}$
95	[0.001, 0.0013]	[0.9691, 0.9808]	[0.05 , 0.053]	[0.0057, 0.0077]	[0.0366 , 0.0269]
87	[0.001, 0.0013]	[0.9736 , 0.9837]	[0.06 , 0.063]	[0.0035, 0.0046]	[0.0299 ,0.0209]
71	[0.001, 0.0013]	[0.9818 , 0.9889]	[0.07 , 0.073]	[0.0046 ,0.0058]	[0.0228 ,0.0169]
72	[0.002 , 0.0023]	[0.9503 , 0.9614]	[0.05 , 0.053]	[0.0277 ,0.0277]	[0.0774 , 0.0663]
70	[0.002 ,0.0023]	[0.9506 , 0.9614]	[0.06 , 0.063]	[0.0105 , 0.0132]	[0.0599 , 0.0518]
67	[0.002 ,0.0023]	[0.9543 , 0.9643]	[0.07 , 0.073]	[0.0062 , 0.0077]	[0.0519 , 0.0434]
45	[0.003, 0.0033]	[0.9571, 0.9638]	[0.05, 0.053]	[0.0879 , 0.1018]	[0.1308 , 0.1380]
48	[0.003, 0.0033]	[0.9520 , 0.9594]	[0.06 ,0.063]	[0.0443 , 0.0517]	[0.0923 , 0.0923]
45	[0.003, 0.0033]	[0.9571 , 0.9638]	[0.07 ,0.073]	[0.0331 , 0.0384]	[0.076 , 0.0746]
36	[0.004, 0.0043]	[0.9539 , 0.9594]	[0.05 ,0.053]	[0.1463 , 0.1652]	[0.1924 ,0.2058]
37	[0.004, 0.0043]	[0.9517 ,0.9574]	[0.06 ,0.063]	[0.0918 , 0.1038]	[0.1401 ,0.1464]
35	[0.004, 0.0043]	[0.9561 ,0.9614]	[0.07 , 0.073]	[0.0714 , 0.0802]	[0.1153 , 0.1188]
28	[0.005, 0.0053]	[0.9572 , 0.9614]	[0.05 ,0.053]	[0.2338 , 0.2577]	[0.2766 , 0.2963]
27	[0.005, 0.0053]	[0.9599 , 0.9638]	[0.06 ,0.063]	[0.1819 , 0.1996]	[0.222 , 0.2358]

9. Conclusion

In this paper Special Purpose Double Sampling plan of Type $DSP(0,1)$ is developed using trapezoidal fuzzy number. The main purpose of double sampling method over a single sampling plan is to minimize the overall amount of vital inspection. Sample size in case of double sampling method is less than the sample size needed for a single sampling method. Fuzzy Binomial distribution is used to calculate the interval value of Fuzzy proportion defective and Fuzzy probability of acceptance. From the FOC curve one can conclude that when γ increases from 0 to 1 the width of FOC curve becomes less. The sample size is calculated such that it satisfies the inequality conditions of producer's risk and consumer's risk. The sum of producer's and consumer's risks are minimized and obtained as interval of fuzzy and the optimum value for n is calculated. In future, the same concept is applied for various chain sampling plans and special purposes plans.

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