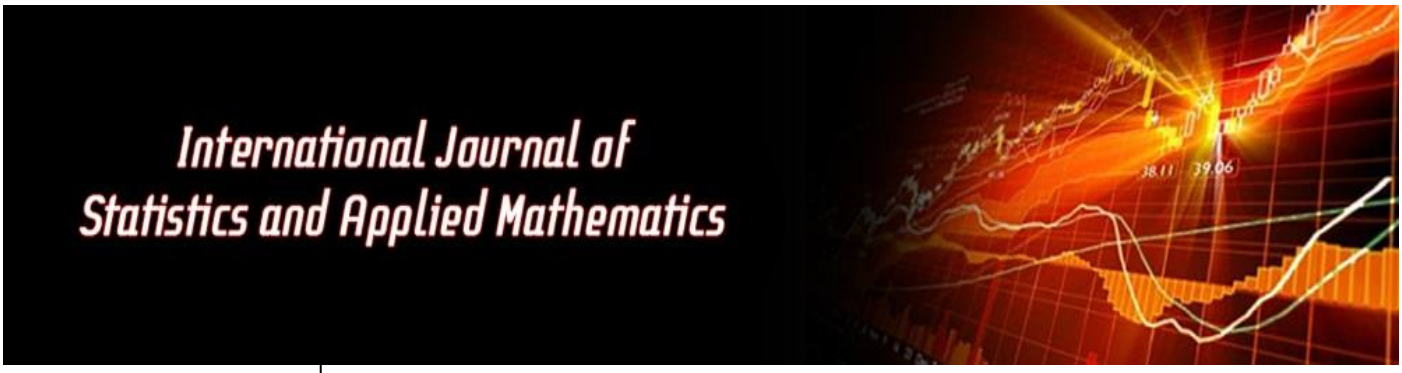
International Journal of Statistics and Applied Mathematics 2024; SP-9(5): 23-25



ISSN: 2456-1452
Maths 2024; SP-9(5): 23-25

www.mathsjournal.com
Received: 14-06-2024
Accepted: 20-07-2024

Sabarish P
Assistant Professor, Department of Statistics, PSG College of Arts & Science, Coimbatore, Tamil Nadu, India

Senthilkumar D
Associate Professor, Department of Statistics, PSG College of Arts & Science, Coimbatore, Tamil Nadu, India

Corresponding Author:
Sabarish P
Assistant Professor, Department of Statistics, PSG College of Arts & Science, Coimbatore, Tamil Nadu, India

Construction and selection of double inspection resampling scheme

Sabarish P and Senthilkumar D

Abstract
In production process, sometimes non acceptance overcomes the acceptance criteria, in that situation we using resampling plan. This article describes construction and selection of double inspection sampling plan for resampling situation with reference to Single Sampling Plan. Tables are constructed for easy selection of sample size and suitable numerical illustration is given.

Keywords: Single sampling, double inspection sampling plan, resampling, OC

Introduction
In the situation of expensive or large number of lot will be rejected producer face heavy loss so they do some additional support. Senthilkumar and Sabarish (2020) [2] have developed the Construction and Selection of Double Inspection Single Sampling Plan [DISSP (0, 1)]. Its inspect the two major quality characteristics of the same product to reduce the error free product in production and also the plan help to the consumer to get good quality products. Senthilkumar and Sabarish (2021) [3] have developed Selection and Development of Double Inspection Single Sampling Plan. Senthilkumar and Sabarish (2021) [3] have developed Economic Design of Double Inspection Single Sampling Plan. In case non acceptance overcomes the double inspection plan add some additional plan or scheme try to accept the lot that named as resampling scheme. Govindaraju and Ganesalingam (1997) has proposed an attribute sampling plan which can be applied in situations where resampling is permitted on lots not accepted on original inspection. They have derived the performance measures of the resampling scheme having single sampling attributes plan as the reference plan. In this plan, it is assumed that during the course of resubmission, the quality of the lot is not improved by sorting etc. They have also discussed the need for a provision for resampling of lots in case of zero acceptance sampling plans. A resubmitted lot is defined in the ANSI/ASQC Standard A2-1987 (1987) as the one which has been designated as not-acceptable and which is submitted again for acceptance inspection after having been further tested, sorted, reprocessed etc. If the lot is not accepted on original inspection, the producer may test it and may also resubmit it without sorting or reprocessing it for resampling.
Recently, some of the authors have investigated the impact of resampling scheme under various situations. Aslam *et al.* (2012) [7] have developed Bayesian sampling inspection for resubmitted lots under gamma-Poisson distribution. The work presented in this paper is construction and selection of double inspection sampling plan for resampling situation with reference to Single Sampling Plan.

Operating procedural statement
First inspection
- Select a random sample of size ‘n’ units from the lot and test each unit for conformance to the specified attribute requirements.
- Count the Number of defectives in the first inspection ‘d_1’ then move to next step.
- If $d_1 \leq c_1$ Pass the same sample for the second inspection for the same sample of size ‘n’ otherwise ($d_1 > c_1$) reject the lot in the original inspection, apply the reference plan ‘m’ times and reject the lot if it is not accepted on $(m-1)^{st}$ resubmission.

Second Inspection

- Count the number of defectives in second inspection for the same sample, d_2 then move to next step.
- If $d_2 \leq c_2$ accept the lot otherwise ($d_2 > c_2$) reject the lot in the original inspection, apply the reference plan 'm' times and reject the lot if it is not accepted on $(m-1)^{st}$ resubmission.

Operating characteristic function

$$P_a(p) = P_a(2 - P_a) \quad (1)$$

$$P_a(p) = P_{a1}(p) * P_{a2}(p) \quad (2)$$

Illustration

A smart glass manufacturing company two inspectors checking two different quality Characteristics like Checking quality of the display (c_1) and Checking the performance of the Sensor(c_2) these two quality characteristics are Important and costliest, the inspection are independent. Here the inspector fixing the parameters like sample size n = 60, acceptance number for first inspection c_1 = 1, acceptance number for second inspection c_2 = 2 and resubmission the lot m=2.

Table 1: Values of Probability of Acceptance

p	DIRS	p	DIRS
0.01	0.99166	0.06	0.23931
0.02	0.92418	0.07	0.13647
0.03	0.77509	0.08	0.07332
0.04	0.57952	0.09	0.03756
0.05	0.38966	0.10	0.01852

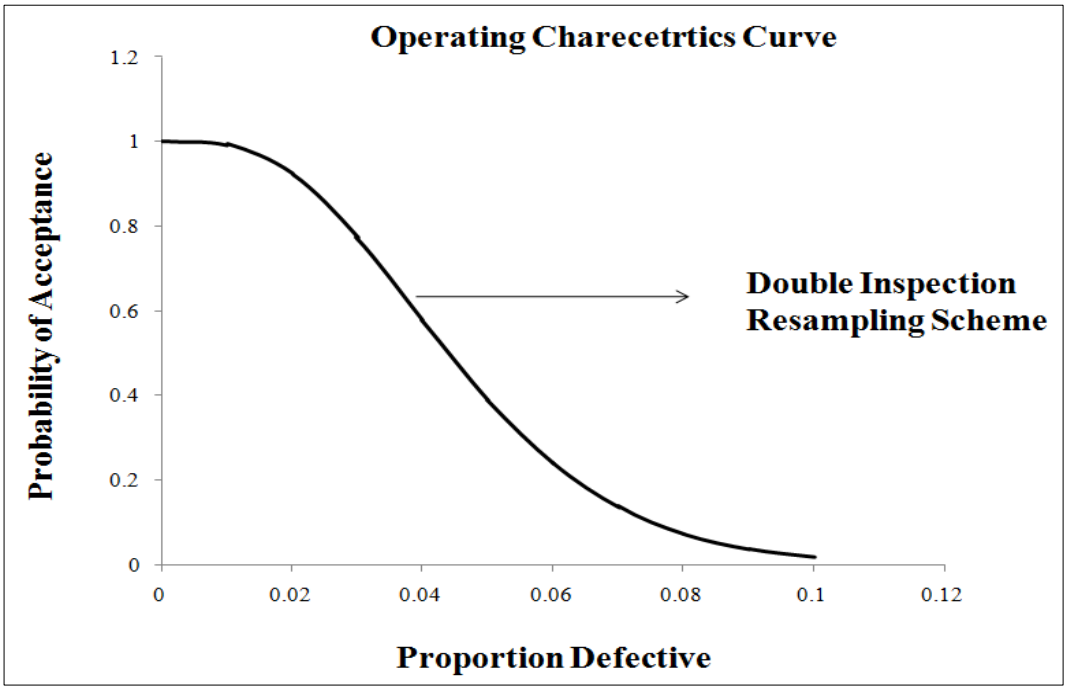


Fig 1: Operating characteristics curve

Description of Tables and Figures

Table 1 shows the values of Probability of Acceptance for Double Inspection Resampling Scheme based on the Parameters are n=60; c_1=1, c_2=2 and m=2 also its helps to plot the Operating Characteristics Curve. Figure 1 Shows the Operating Characteristics Curve for Double Inspection Resampling Scheme based on the Parameters are n=60; c_1=1, c_2=2 and m=2. Table 2 locates the values of sample size n for different acceptance numbers they are indexed by the parameters of m=2, c_1 and c_2 by Pa (p).

Table 2: Shows the values of sample size 'n' its Indexed by the plan parameters Pa(p), c_1 & c_2

p		0.001			0.002			0.003		
c_1	c_2	0.99	0.95	0.90	0.99	0.95	0.90	0.99	0.95	0.90
1	2	527	869	1101	263	434	550	175	289	367
	3	531	888	1138	265	444	569	177	296	379
	4	532	889	1141	266	445	570	179	297	380
	5	533	892	1143	267	447	572	180	300	380
2	3	1086	1577	1889	543	788	944	362	525	629
	4	1101	1621	1960	550	810	980	367	540	653
	5	1102	1626	1972	551	813	986	369	542	657
3	4	1713	2329	2706	856	1164	1353	571	776	902
	5	1742	2398	2808	871	1199	1404	580	799	936
4	5	2383	3108	3542	1191	1554	1771	794	1036	1180
p		0.004			0.005			0.006		
c_1	c_2	0.99	0.95	0.90	0.99	0.95	0.90	0.99	0.95	0.90
1	2	131	217	275	105	173	220	87	144	183
	3	132	222	284	106	177	227	88	148	189

	4	134	224	285	107	178	228	89	149	190
	5	135	225	286	108	179	229	91	150	191
2	3	271	394	472	217	315	377	181	262	314
	4	275	405	490	220	324	392	183	270	326
	5	277	406	493	222	326	394	185	271	328
3	4	428	582	676	342	465	541	285	388	451
	5	435	599	702	348	479	561	290	399	468
4	5	595	777	885	476	621	708	397	518	590

Table 2: Continued

p		0.007			0.008		
c_1	c_2	0.99	0.95	0.90	0.99	0.95	0.90
1	2	75	124	157	65	108	137
	3	76	126	162	66	111	142
	4	77	127	163	68	113	143
	5	78	128	164	69	114	145
2	3	155	225	269	135	197	236
	4	157	231	280	137	202	245
	5	159	232	282	138	204	247
3	4	244	332	386	214	291	338
	5	248	342	401	217	299	351
4	5	340	444	506	297	388	442
p		0.009			0.01		
c_1	c_2	0.99	0.95	0.90	0.99	0.95	0.90
1	2	58	96	122	52	87	110
	3	59	99	126	53	89	113
	4	60	100	128	54	90	114
	5	61	101	129	56	91	116
2	3	120	175	209	108	158	188
	4	122	180	217	110	162	196
	5	123	181	219	111	163	197
3	4	190	258	300	171	232	270
	5	193	266	312	174	239	280
4	5	264	345	393	238	310	354

Conclusion

The proposed Double Inspection Resampling Scheme (n; c_1, c_2 and m) is suitable, when there is a possibility of producing expensive products (or) large number of units production, with the aim to produce good products under the OC function for Double Inspection with reference to Single Sampling Plan of bivariate Poisson distribution. This plan provides protection to both producer and consumers. It can be applicable for manufacturing industries like Foods, Smart phones, Gold ornament and so on where the human intervention is much involved.

Reference

1. Dodge H. A new dual system of acceptance sampling. Technical Report No. 16. Statistics Centre, Rutgers-The State University; c1967.
2. Senthilkumar A, Sabarish S. Construction and selection of double inspection single sampling plan by attributes [DISSP (0, 1)]. Int. J Disaster Recovery Business Continuity. 2020;11:3295-304.
3. Senthilkumar A, Sabarish S. Selection and development of double inspection single sampling plan. Bull Monumental. 2021;22:7-12.
4. Senthilkumar A, Sabarish S. Economic design of double inspection single sampling plan. GIS Sci. J. 2021;8:568-583.
5. Senthilkumar A, Sabarish S. Design of double inspection quick switching system [DIQSS (0, 1)]. Int J Mech Eng. 2022;7:421-424.
6. Senthilkumar A, Sabarish S. Construction and selection of double inspection single sampling plan for an independent process using bivariate Poisson distribution. Math Stat. 2022;10(4):799-807.
7. Aslam M, Balamurali S, Jun C-H, Ahmad M. Bayesian sampling inspection for resubmitted lots under Gamma-Poisson distribution. Res J Appl. Sci. Eng. Technol. 2012;4(23):5171-5176.
8. Aslam M, Jun C-H, Lio Y, Ahmad M, Rasool M. Group acceptance sampling plans for resubmitted lots under Burr Type XII distributions. J Chinese Inst Ind Eng. 2011;28:606-615.
9. Aslam M, Wu C-W, Azam M, Jun C-H. Variables sampling inspection for resubmitted lots based on process capability index Cpk for normally distributed items. Appl Math Model. 2013;37:667-675.
10. Balamurali S, Azam M, Aslam M. Attribute-variable inspection lots policy using resampling based on EWMA. Commun Stat Simul Comput. 2015;44:3061-3074.
11. Wu C-W, Aslam M, Jun C-H. Variables sampling inspection scheme for resubmitted lots based on process capability index Cpk. Eur. J Oper. Res. 2012;217:560-566.