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Evaluation of Bayesian Quick Switching Repetitive Group Sampling System for Designing Basic Quality levels

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Abstract
Sampling plans are widely used in industries towards maintaining and designing various quality levels to protect both the producer and consumer. This paper proposed a new designing procedure under Bayesian Quick Switching System with Repetitive Group Sampling plan as reference plan indexed through consumer and producer quality levels. It is follows that, the defects occurrences in sample unit may follows a Zero Inflated Poisson distribution (ZIP) and the conjugate prior to the average number of non-conformities per item follows Gamma distribution. This article designed a sampling procedure under Bayesian perspective on Repetitive Group Sampling plan as reference plan using Gamma-Zero Inflated Poisson (G-ZIP) distribution. Tables are constructed for various combinations of plan parameters and suitable illustrations are provided for the designated system as Bayesian Quick Switching Repetitive Group Sampling Systems (BQSRGSS).

Keywords: Acceptable Quality Level, Limiting Quality Level, Quick Switching System, Single sampling plan, acceptance levels

Introduction

Statistical Quality Control is a set of tools used by quality specialists to maintain and to control the quality of the manufacturing item. It is an important statistical inspection procedure involves various sampling techniques which leads to improve the quality of the product from time to time. Among the various available techniques in acceptance sampling the most popularly used methods are Process Control and Product Control are the two main dimensions to monitor the quality of the product. Even though the quality of a product can be evaluated in several ways the popular method is Acceptance sampling which is a product control techniques. Acceptance Sampling plays a vital role in improving the quality of the lot not towards the quality of the item which is manufactured, when a decision is to be taken on a lot it can done based on sample inspection from the manufacturing lots. It provides the rule in which a product is to sampled, tested and decision is to be made. The information gathered from the process provides an useful information to a vendor to take a decision, whether the products are in control state or it needs some improvement from the manufacturing process. Here, a new sampling system in the quality control is studied with its plan parameters, which consists of pairs of normal and tightened plans situations occurs was proposed by Dodge (1967) [4]. Any system of sampling inspection involving normal and tightened inspection is usually referred as Two-Plan system. The system considers tightened inspection plans for the poor quality levels and normal inspection plans for good quality levels involving smaller sample size for the decision about the quality of lots. Due to instantaneous switching between normal and tightened plan this system is referred as "Quick Switching System". Romboski (1969) [8] has introduced the concept of QSS-1 (n; c_N, c_T) is a system which considers with one sample size with two acceptance number (n, C_N) and (n, C_T) which are the normal-tightened plans with c_N, c_T and introduced another type denoted as QSS-1 (n, kn, C_0) which is QSS-1 with two sample size and one acceptance number are studied with (n, C_0) and (kn, C_0), k>1 are considered as normal and tightened plan respectively. In this paper system the Repetitive Group Sampling plan as reference plan is studied under the first type of QSS-1 (n; c_N, c_T).

In acceptance sampling plan, the typical applications is disposition of the lot or sometimes referred as lot sentencing. Lambert D. (1992) [7] has studied Zero-inflated Poisson regression with an application to defects in manufacturing units. Let us consider an example in a large super market receiving many manufacturing products from various vendors and they involved in inspection activities with more zero inflations. This super market receives products from various suppliers to its various departments each involved with inspection methods. A supermarket manager wishes to test the products to make sure that the received products are good in conditions and there are fresh and in good quality. A sample is taken from the lot, some quality characteristics are tested and decision is made either to accept or not to accept the lot. In general, the production processes are not continuously stable in all such circumstances and the incoming items found from such processes may lead to random fluctuations that will affect the quality variations in each lot. The two major types of quality variations are studied in sampling inspection such as within-lot variation and between-lot variation. In between-lot variation the occurrence of defects are vary from the other, the proportion of nonconforming units in the lots will vary frequently.

In such circumstances exists, many research discussions were made on designing a sampling plan under Bayesian perspective. In this paper, a new designing methodology is proposed and it can be utilized when the quality engineer has the prior knowledge on the suppliers to decide the disposition of the lot under QSS conditions. Further, the concepts and models were developed under Bayesian perspective and selection of sampling plans are based on prior information exists for the lot fraction nonconforming has been studied in details. Hald (1981) [5], Case and Keats (1982) [2], Calvin (1990) [1]. Pandey (1972) Discussed a Bayesian Single Sampling plan by attributes with three decision criteria for discrete prior distribution. Suresh and Latha (2001) [9] investigated the Bayesian Single Sampling Plans for a Gamma Prior distribution. Pradeepa Veerakumari (2009) [11] has studied some prior information under Bayesian acceptance sampling plan.

Romboski (1969) [8] has presented tables for the selection of QSS-1 (n, C_N, C_T) system for given p_1, p_2, α, and β. Devaraj Arumainayagam (1991) [3] has studied the construction to the study of Quick Switching system (QSS) and its applications. Suresh *et al* (2002) has studied the QSSSTDS indexed with (p_1, h_1) and (p_2, h_2). Kaviyarasu (2012) has studied the QSS-1 with Conditional RGS plan as reference plan using acceptable and limiting quality levels through incentive and filter effects are carried out to design the plans for specified AQL (or LQL) with the ratio of relative slopes h_2/h_1 have also been done. Romboski (1969) [8] has also made certain modification and studied the merits and demerits of switching rules of QSS when it is compared with two-plan system (m,d). The rule of QSS is retained at m=1 where as tightened rule is made when d>1.

Conditions for Application:

1. The production is steady so that results on current and preceding lots are broadly indicative of a continuing process and submitted lots are accepted to be essentially of the same quality.
2. Lots are submitted substantially in the order of production.
3. Inspection is by attributes with quality defined as fraction nonconforming.

Quick switching systems (QSS) increase the likelihood of identifying the defective items in sampling inspection while reducing the number of units to be inspected. QSS consist of two sampling procedures plus a set of rules for switching between them. Romboski (1969) [8] introduced QSS-1 (n; C_N, C_T) which is a QSS-1 with single sampling plan as a reference plan.

The Operating Procedure for QSS-1 (n; c_N, c_T)

The following operating procedure explains the importance of implementing QSS-1:

Step1:- From a lot, take a random sample of size 'n' at normal level, count the defectives 'd' under the conditions of RGS.

a. If $d \le C_N$ accept the lot and repeat step1.
b. If $d > C_N$ reject the lot and go to step2.

Step 2:- From the next lot take a random sample of size 'n' at tightened level. Count the defectives 'D'.

a. If $D \le C_T$ accept the lot and continue the inspection for next one lot to be accepted. If so go to step-1 otherwise repeat step2.
b. If $D > C_T$ reject the lot and repeat step2.

Thus the Quick Switching System is studied with various plan parameters with the prior information about the past data which are characterized with five parameters namely, n, u_1, u_2, v_1, v_2. Here, it may be observed that when $u_1 = u_2 = v_1 = v_2$ the resulting plan is reduced to the usual Repetitive Group Sampling plan due. Further, it may note that Bayesian Quick Switching Conditional Repetitive Group Sampling plan-1 is applicable to a stream of lots and not for isolated lots. The OC function for the BQSRGSS-1 is based on Romboski (1969) [8] and the expression of OC function for Quick Switching Repetitive Group Sampling System (BQSRGSS)-1 is derived from the following probability function,

$$L(P) = \frac{P_T}{1 - P_N + P_T} \qquad (1)$$

Where,

$$P_N = \frac{P_r(X \le u_1)}{\left[1 - p_r(X \le u_2) + P_r(X \le u_1)\right]} \qquad (2)$$

and

$$P_T = \frac{P_r(X \le v_1)}{\left[1 - p_r(X \le v_2) + P_r(X \le v_1)\right]} \qquad (3)$$

Selection of QSS with RGS through quality levels QSS-1 (n; c_N, c_T)

In this paper two incoming quality levels, namely Acceptable Quality Level (AQL), Limiting quality levels (LQL) are considered along with BRGSP on the OC- curve for selection of QSS-1 plans. The leading features of an OC curve are studied with its location which describes the degree of steepness of the OC curve. Vedaldi (1986) [12] has studied two principal effects of sampling inspection, which are filter and incentive effect has proposed a new criterion based on the AQL and LQL points on the OC curve.

Selection of the Plans

Designing sampling plans for given values of p_1 and p_2 the Table 1 can be used for finding the parameters of QSS-1 (n; C_N, C_T). For given p_1, scan the column headed h_2 using Table

1 which is equal to or just greater than the desired value which locates the corresponding values for C_N, C_T and np.

Designing QSRGSS-1 for plan parameters

Plotting the OC curve

The OC curve for a QSRGSS-1 can be constructed using table 1 to 4. This can be done by dividing each entry for the given values of u_1, u_2, v_1, v_2 by the values of sample size *n*. The result of each division is the number of nonconformities per unit for which the probability of acceptance is shown below.

For example, with $n = 50$, s = 5 and ω = 0.09 division of each of the entries in the $u_1 = 2$, $u_2 = 6$, $v_1 = 1$ and $v_2 = 2$ row of table 2 by 50 leads to the following value given in the table for plotting the OC curve of BQSRGSS-1

L(p)	0.99	0.95	0.90	0.50	0.20	0.10
P	0.0068	0.0114	0.0145	0.0296	0.0499	0.0748

Thus the value n = 50 leads to the value given in the above table for plotting the OC curve. The resulting plan is BQSRGSS-1 (50; 1, 5; 0, 2).

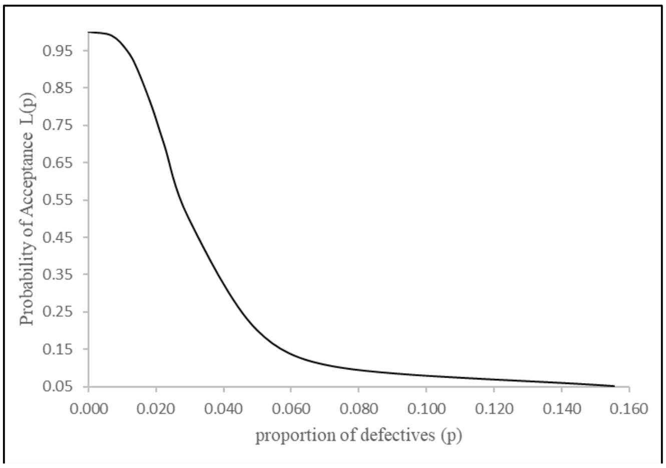

Fig 1: OC Curve for BQSRGSS-1 System

Example: Suppose a yarn manufacturing companies appoints quality inspector, if they wants to apply the proposed sampling plan in their production unit for various types of yarn qualities manufactured in their concern. Initially they starts with the normal inspection and if any rejection comes then they have to tightened their inspection by switching towards from normal to tightened inspection, based on the basic quality levels fixed by the quality practitioners. Here, the AQL= p_1, LQL= p_2 for given $p_1 = 0.296867$ and $p_2 = 0.249007$ from Table 1 under column headed p_1, locate the value which is equal to or just greater than specified p_2 which is 0.249007 corresponding to this p_2, the $u_1= 1$, $u_2 = 2$ and $v_1 = 2$, $v_2 = 1$ values associated with $np_1 = 0.289$ respectively. From this one can obtain the sample size n. Thus the selected parameters for BQSRGSS-1 are n = 12, $u_1= 1$, $u_2 = 2$ and $v_1 = 2$, $v_2 = 1$.

Designing the systems given sample size

Table 2 can be used to design BQSRGSS-1 when the sample size is fixed at n_k and a point on the OC curve (p_k, $p_a(p_k)$) is specified. To design a system, calculate n_kp_k under the column $p_a(p_k)$ in table 2, find the value of *np* which is nearer to the desired value n_kp_k. The u_1, u_2, v_1 and v_2 values corresponding to the selected tabular value together with the given n_k, determine the sampling system can be used.

For example, let $n_k = 80$, $P_k = 0.02$ and $Pa(p_k) = 0.95$. Scan the column headed by $Pa(p_k) = 0.95$, to find the *np* value which is nearer to the desired value $n_kp_k = 0.02 * 80 = 1.6$. The value is 1.6558 which corresponds to the parameters $u_1 = 3$, $u_2 = 4$, $v_1 = 2$ and $v_2 = 3$. The desired BQSRGSS-1 has the parameters n = 80, $u_1 = 3$, $u_2 = 4$, $v_1 = 2$ and $v_2 = 3$.

Example: Let p_1= 0.2, α = 0.05, p_2= 0.66 and β = 0.10 one can calculate the Operating ratio values can be determined through the various tables given in this paper from Table 1-4. Calculate the operating Ratio values OR = p_2/p_1 = 0.22/0.6 = 3.3. From the table-3 the values of OR for α = 0.05 and β = 0.10 which is nearest to the desired ratio is 3.3164. For given values of and Pa(p) equation can be solved for the values of np using method of iterations the corresponding values are $u_1 = 1$, $u_2 = 5$, $v_1 = 0$ and $v_2 = 1$. The sample size is obtained as n = np_1 / p_1 = 1.3221 / 0.2 = 6.6105 = 7. The entries under the various column are calculated through the expression. Thus the desired system for Bayesian Quick Switching Repetitive Group Sampling System of type 1 is n = 7, with its acceptance number $u_1 = 1$, $u_2 = 5$, $v_1 = 0$ and $v_2 = 1$. Thus the BQSRGSS-1 is (7, 1, 5; 0, 1).

Construction of Tables

The expression for probability of acceptance of Bayesian Quick Switching Repetitive Group Sampling System (BQSRGSS)-1 sampling system, under the assumption of Poisson model, the composite OC function is given by equation (1) can be solved with the following

$$P_N = \frac{\sum_{x=o}^{u_1} e^{-np}(np)^x/x!}{1+\left[\sum_{x=0}^{u_1} e^{-np}(np)^x/x! - \sum_{x=0}^{u_2} e^{-np}(np)^x/x!\right]\left[\sum_{x=0}^{u_1} e^{-np}(np)^x/x!\right]^i} \qquad (2)$$

$$P_T = \frac{\sum_{x=o}^{v_1} e^{-np}(np)^x/x!}{1+\left[\sum_{x=0}^{v_1} e^{-np}(np)^x/x! - \sum_{x=0}^{v_2} e^{-np}(np)^x/x!\right]\left[\sum_{x=0}^{v_1} e^{-np}(np)^x/x!\right]^i} \qquad (3)$$

For various assumed values of P_a (p), P_N, P_T and the equation 1 is solved for *np* using iteration techniques. Utilizing the *np* values tabulated for different values of the plan parameters. From table-1 the various incoming quality levels, outgoing quality levels and OR values are calculated for different α and β values are given. Assuming nAOQ = np * Pa(p), value of np which maximizes nAOQ was obtained by the method of successive approximation.

Conclusion

Acceptance sampling methods are widely used in manufacturing industries and other quality inspection places to check the acceptance quality levels reached or not. Here, the units are randomly inspected and a decision is to be made either to accept or not to accept the lot. For practical utility of the plan, Zero-Inflated Poisson unity values have been tabulated for a wider range of plan parameters. This proposed plan can be executed when the RGS plan situation arises to apply under the Quick Switching System under Bayesian perspective. The concept of this investigation may be assistance to the quality control engineers and plan designers towards the development of further new plans to maintain standards in production environment. The present development would be a valuable addition to the literature and useful device to the quality control experts. Further study can be extended simultaneously to the normal and tightened situation when the sample size and its acceptance number can be obtained through classical and Bayesian approach.

Table 1: Unity Values of Bayesian QSRGSS-1 for s=5 and ω=0.05

				Probability of Acceptance $P_a(p)$						Operating Ratio			
u_1	**u_2**	**v_1**	**v_2**	**0.99**	**0.95**	**0.90**	**0.50**	**0.20**	**0.10**	**α=0.01 β=0.10**	**α=0.01 β=0.20**	**α=0.05 β=0.10**	**α=0.05 β=0.20**
0	2	0	1	0.3357	0.5802	0.7417	1.5594	2.7947	4.4501	13.2554	8.3246	7.6702	4.8170
0	3	0	2	0.5919	0.9072	1.1027	2.0168	3.2843	4.9603	8.3810	5.5493	5.4678	3.6204
0	3	0	1	0.5739	0.8530	1.0268	1.8195	2.9519	4.5292	7.8917	5.1434	5.3094	3.4604
0	4	0	1	0.7968	1.1167	1.2932	2.0825	3.1429	4.6436	5.8280	3.9446	4.1583	2.8145
1	2	0	1	0.3589	0.6644	0.8648	1.8300	3.1246	4.7706	13.2935	8.7069	7.1800	4.7027
1	3	1	2	0.6571	1.0697	1.3339	2.6942	4.6817	7.1783	10.9238	7.1246	6.7103	4.3765
1	3	0	1	0.6194	0.9726	1.1751	2.1097	2.9825	4.8780	7.8750	4.8151	5.0153	3.0665
1	4	1	2	0.9644	1.3950	1.6760	2.9663	4.8147	7.2373	7.5048	4.9926	5.1880	3.4514
1	4	0	2	0.9550	1.3435	1.5853	2.5786	3.8078	5.4229	5.6781	3.9871	4.0363	2.8342
1	5	1	2	1.2414	1.3950	1.6760	2.9663	4.8147	7.2373	5.8299	3.8784	5.1880	3.4514
1	5	0	2	1.2216	1.3435	1.5853	2.5786	3.8078	5.4229	4.4391	3.1171	4.0363	2.8342
1	5	0	1	1.1329	1.2560	1.4706	2.3933	3.5417	5.0677	4.4731	3.1261	4.0350	2.8199
2	3	1	2	0.6827	1.1407	1.4419	2.9633	4.9898	7.4632	10.9314	7.3086	6.5427	4.3744
2	4	1	2	1.0045	1.4977	1.8079	3.2491	5.1452	7.5424	7.5089	5.1223	5.0359	3.4354
2	6	1	3	1.6506	2.2311	2.5710	4.0078	5.7957	8.1276	4.9241	3.5113	3.6428	2.5977
2	6	1	2	1.6070	2.1424	2.4625	3.8292	5.5436	7.8144	4.8626	3.4496	3.6474	2.5875
2	6	0	1	1.4252	1.8938	2.1498	3.2130	4.4548	6.0095	4.2166	3.1257	3.1732	2.3523
2	7	1	2	1.8419	2.4496	2.7642	4.1213	5.7734	7.9739	4.3293	3.1346	3.2552	2.3569
2	7	0	3	1.8621	2.3972	2.6798	3.8339	5.1694	6.8776	3.6935	2.7761	2.8690	2.1564
2	7	0	1	1.6883	2.1683	2.4326	3.5194	4.7603	6.8776	4.0736	2.8196	3.1719	2.1954
3	4	2	3	1.0382	1.6347	2.0352	4.0793	6.8104	10.0793	9.7081	6.5596	6.1659	4.1662
3	4	0	1	0.9493	1.3538	1.6118	2.7444	4.1596	5.9518	6.2700	4.3820	4.3963	3.0725
3	5	1	2	1.3224	1.9035	2.2369	3.7597	5.6579	8.0602	6.0953	4.2787	4.2344	2.9724
3	5	2	3	1.3710	2.0230	2.4304	4.3667	6.9361	10.1425	7.3979	5.0592	5.0136	3.4286
3	8	0	4	2.2590	2.8797	3.2059	4.5323	6.0790	8.0190	3.5498	2.6910	2.7847	2.1110
3	10	0	1	2.0115	2.5179	2.8175	4.0448	5.4486	7.1553	3.5573	2.7088	2.8418	2.1640

Table 2: Unity Values of Bayesian QSRGSS-1 s=5 and ω=0.09

					Probability of Acceptance $P_a(p)$					Operating Ratio			
u_1	**u_2**	**v_1**	**v_2**	**0.99**	**0.95**	**0.90**	**0.50**	**0.20**	**0.10**	**α=0.01 β=0.10**	**α=0.01 β=0.20**	**α=0.05 β=0.10**	**α=0.05 β=0.20**
0	2	0	1	0.3432	0.5984	0.7673	1.6649	3.2830	8.0058	23.3247	9.5648	13.3778	5.4858
0	3	0	2	0.5860	0.9294	1.1350	2.1590	3.8902	9.1681	15.6455	6.6387	9.8644	4.1857
0	3	0	1	0.5849	0.8746	1.0612	1.9453	3.4716	8.0898	13.8311	5.9353	9.2501	3.9695
0	4	0	1	0.8100	1.1475	1.3397	2.2344	3.7087	8.4991	10.4930	4.5788	7.4065	3.2319
1	2	0	1	0.3671	0.6770	0.8859	1.9417	3.6556	8.4374	22.9831	9.9577	12.4629	5.3996
1	3	1	2	0.6681	1.0908	1.3654	2.8308	5.3411	12.1630	18.2048	7.9942	11.1500	4.8963
1	3	0	1	0.6320	0.9938	1.2099	2.2420	3.8755	8.7786	13.8892	6.1317	8.8337	3.8998
1	4	1	2	0.9776	1.4266	1.7157	3.1189	5.5105	12.2665	12.5472	5.6366	8.5982	3.8626
1	4	0	2	0.9688	1.3778	1.6268	2.7487	4.4726	9.8004	10.1158	4.6166	7.1130	3.2462
1	5	1	2	1.2299	1.4266	1.7157	3.1189	5.5105	12.2665	9.9737	4.4805	8.5982	3.8626
1	5	0	2	1.2358	1.3778	1.6268	2.7487	4.4726	9.8004	7.9306	3.6193	7.1130	3.2462
1	5	0	1	1.1575	1.2920	1.5169	2.5509	4.1309	9.0190	7.7921	3.5690	6.9807	3.1973
2	3	1	2	0.6731	1.1610	1.4725	3.1069	5.6985	12.5881	18.7010	8.4658	10.8429	4.9085
2	4	1	2	1.0169	1.5198	1.8466	3.4103	5.8750	12.6464	12.4366	5.7775	8.3209	3.8655
2	6	1	3	1.6620	2.2708	2.6342	4.2194	6.6254	13.8441	8.3297	3.9863	6.0965	2.9176
2	6	1	2	1.6343	2.1815	2.5216	4.0281	6.3326	13.2231	8.0911	3.8749	6.0615	2.9029
2	6	0	1	1.4624	1.9520	2.2270	3.4493	5.2264	10.5080	7.1853	3.5738	5.3831	2.6774
2	7	1	2	1.8991	2.4943	2.8342	4.3434	6.5937	13.4971	7.1070	3.4719	5.4113	2.6435
2	7	0	3	1.9188	2.4605	2.7745	4.1319	6.1115	12.4124	6.4690	3.1851	5.0447	2.4839
2	7	0	1	1.7301	2.2383	2.5321	3.7915	5.5782	12.4124	7.1743	3.2242	5.5455	2.4922
3	4	2	3	1.0505	1.6558	2.0697	4.2537	7.6877	16.6259	15.8267	7.3181	10.0413	4.6430
3	4	0	1	0.9645	1.3868	1.6633	2.9452	4.9422	10.9423	11.3454	5.1242	7.8904	3.5637
3	5	1	2	1.3409	1.9293	2.2826	3.9537	6.4800	13.6859	10.2066	4.8326	7.0936	3.3587
3	5	2	3	1.3710	2.0520	2.4705	4.5568	7.8453	16.7151	12.1919	5.7223	8.1458	3.8233
3	8	0	4	2.2887	2.9712	3.3335	4.9145	7.2298	14.2594	6.2304	3.1590	4.7992	2.4333
3	10	0	1	2.0220	2.6158	2.9352	4.3869	6.4500	12.6027	6.2329	3.1900	4.8180	2.4658

Table 3: Unity Values of Bayesian QSRGSS-1 s=10 and ω=0.05

				Probability of Acceptance $P_a(p)$						Operating Ratio			
u_1	u_2	v_1	v_2	0.99	0.95	0.90	0.50	0.20	0.10	α=0.01 β=0.10	α=0.01 β=0.20	α=0.05 β=0.10	α=0.05 β=0.20
0	2	0	1	0.3580	0.6069	0.7637	1.5138	2.5395	3.7974	10.6073	7.0937	6.2570	4.1844
0	3	0	2	0.6233	0.9527	1.1393	1.9674	3.0065	4.2788	6.8652	4.8239	4.4910	3.1557
0	3	0	1	0.6037	0.8946	1.0585	1.7759	2.7005	3.8852	6.4352	4.4730	4.3430	3.0187
0	4	0	1	0.8472	1.1693	1.3422	2.0491	2.9087	4.0324	4.7596	3.4332	3.4487	2.4876
1	2	0	1	0.3866	0.6923	0.8850	1.7692	2.8378	4.0791	10.5514	7.3407	5.8918	4.0989
1	3	1	2	0.7172	1.1241	1.3866	2.6027	4.1703	5.9383	8.2795	5.8145	5.2829	3.7100
1	3	0	1	0.6812	1.0184	1.2116	2.0525	3.0307	4.2013	6.1675	4.4490	4.1253	2.9759
1	4	1	2	1.0152	1.4829	1.7426	2.8741	4.3015	5.9917	5.9023	4.2373	4.0405	2.9007
1	4	0	2	1.0020	1.4248	1.4186	2.5167	3.5006	4.6762	4.6671	3.4938	3.2821	2.4570
1	5	1	2	1.3359	1.4829	1.7426	2.8741	4.3015	5.9917	4.4852	3.2200	4.0405	2.9007
1	5	0	2	1.3291	1.4248	1.6412	2.5167	3.5006	4.6762	3.5184	2.6339	3.2821	2.4570
1	5	0	1	1.2470	1.3221	1.5238	2.3464	3.2716	4.3847	3.5163	2.6237	3.3164	2.4745
2	3	1	2	0.7235	1.2051	1.5005	2.8557	4.4387	6.1845	8.5479	6.1350	5.1321	3.6834
2	4	1	2	1.0736	1.5889	1.8843	3.1407	4.6024	6.2688	5.8393	4.2870	3.9453	2.8965
2	6	1	3	1.8097	2.3916	2.6934	3.9022	5.2278	6.8014	3.7582	2.8887	2.8438	2.1859
2	6	1	2	1.7713	2.2899	2.5780	3.7392	5.0230	6.5487	3.6970	2.8357	2.8598	2.1936
2	6	0	1	1.5716	2.0164	2.2548	3.1957	4.1939	5.3186	3.3843	2.6686	2.6377	2.0799
2	7	1	2	2.0851	2.6193	2.9066	4.0474	5.2774	6.7372	3.2311	2.5310	2.5721	2.0148
2	7	0	3	2.0650	2.5519	2.8048	3.8042	4.8612	6.1032	2.9555	2.3541	2.3916	1.9049
2	7	0	1	1.8475	2.3226	2.5640	3.5259	4.5320	6.1032	3.3036	2.4531	2.6277	1.9513
3	4	2	3	1.1167	1.7494	2.1372	3.9262	5.9813	8.1764	7.3217	5.3561	4.6738	3.4191
3	4	0	1	0.9998	1.4330	1.6671	2.6835	3.8415	5.1909	5.1917	3.8422	3.6223	2.6807
3	5	1	2	1.4575	2.0254	2.3425	3.6490	5.0932	6.7059	4.6011	3.4946	3.3110	2.5147
3	5	2	3	1.5315	2.1703	2.5571	4.2130	6.1190	8.2401	5.3806	3.9955	3.7968	2.8194
3	8	0	4	2.4916	3.0817	3.3793	4.5263	5.7511	7.1722	2.8785	2.3082	2.3273	1.8662
3	10	0	1	2.2099	2.7079	2.9950	4.0919	5.2448	6.5249	2.9526	2.3733	2.4096	1.9368

Table 4: Unity Values of Bayesian QSRGSS-1 s=10 and ω=0.09

				Probability of Acceptance $P_a(p)$						Operating Ratio			
u_1	u_2	v_1	v_2	0.99	0.95	0.90	0.50	0.20	0.10	α=0.01 β=0.10	α=0.01 β=0.20	α=0.05 β=0.10	α=0.05 β=0.20
0	2	0	1	0.3699	0.6212	0.7860	1.6099	2.9412	6.2594	16.9226	7.9517	10.0769	4.7350
0	3	0	2	0.6295	0.9763	1.1771	2.1005	3.5104	7.1523	11.3620	5.5766	7.3260	3.5957
0	3	0	1	0.6098	0.9189	1.0947	1.8945	3.1332	6.4262	10.5388	5.1384	6.9938	3.4100
0	4	0	1	0.8859	1.2093	1.3940	2.1953	3.3835	6.6801	7.5407	3.8193	5.5239	2.7979
1	2	0	1	0.3905	0.7086	0.9095	1.8735	3.2670	6.6432	17.0139	8.3671	9.3753	4.6106
1	3	1	2	0.7394	1.1481	1.4162	2.7196	4.6721	9.1050	12.3136	6.3186	7.9305	4.0694
1	3	0	1	0.6998	1.0402	1.2492	2.1765	3.4881	6.8171	9.7419	4.9846	6.5534	3.3532
1	4	1	2	1.0514	1.5117	1.7812	3.0128	4.8408	9.2196	8.7692	4.6043	6.0987	3.2021
1	4	0	2	1.0120	1.4529	1.6841	2.6783	4.0443	7.6490	7.5585	3.9965	5.2647	2.7836
1	5	1	2	1.3493	1.5117	1.7839	3.0128	4.8408	9.2196	6.8331	3.5877	6.0987	3.2021
1	5	0	2	1.3395	1.4529	1.6892	2.6783	4.0443	7.6490	5.7105	3.0194	5.2647	2.7836
1	5	0	1	1.2771	1.3567	1.5725	2.4937	3.7624	7.0684	5.5347	2.9461	5.2099	2.7732
2	3	1	2	0.7307	1.2171	1.5300	2.9799	4.9646	9.4240	12.8964	6.7939	7.7430	4.0790
2	4	1	2	1.1126	1.6168	1.9241	3.2807	5.1548	9.5420	8.5759	4.6329	5.9018	3.1883
2	6	1	3	1.8627	2.4301	2.7568	4.0943	5.8850	10.4108	5.5892	3.1595	4.2841	2.4217
2	6	1	2	1.7856	2.3343	2.6430	3.9231	5.6357	9.9503	5.5724	3.1561	4.2626	2.4143
2	6	0	1	1.6174	2.0841	2.3405	3.4309	4.8515	8.4463	5.2220	2.9995	4.0528	2.3279
2	7	1	2	2.1108	2.6708	2.9830	4.2557	5.9319	10.2491	4.8555	2.8102	3.8374	2.2210
2	7	0	3	2.0857	2.6343	2.9170	4.0968	5.6513	9.7916	4.6947	2.7096	3.7170	2.1453
2	7	0	1	1.9143	2.4048	2.6713	3.8002	5.2466	9.7916	5.1148	2.7407	4.0717	2.1817
3	4	2	3	1.1279	1.7669	2.1729	4.0733	6.6126	12.0512	10.6846	5.8627	6.8205	3.7425
3	4	0	1	1.0098	1.4676	1.7225	2.8789	4.5018	8.5971	8.5133	4.4579	5.8581	3.0675
3	5	1	2	1.4871	2.0594	2.3939	3.8253	5.7254	10.2444	6.8889	3.8501	4.9744	2.7801
3	5	2	3	1.5384	2.1920	2.6010	4.3722	6.7788	12.1445	7.8943	4.4064	5.5404	3.0925
3	8	0	4	2.5774	3.1980	3.5230	4.8980	6.7201	11.4351	4.4367	2.6073	3.5757	2.1013
3	10	0	1	2.2680	2.8213	3.1328	4.4403	6.1078	10.2151	4.5040	2.6931	3.6207	2.1649

References

1. Calvin TW. How and When to Perform Bayesian Acceptance Sampling. American Society for Quality Control, Wisconsin 1990, 7.
2. Case KE, Keats JB. On the selection of a prior distribution in Bayesian Acceptance Sampling, Journal of Quality Technology 1982;14(1):10-18.
3. Devaraj Arumainayagam S. Contribution to the Study of Quick Switching System and its Application, Ph.D.,

Thesis, Department of Statistics, Bharathiar University Coimbatore, Tamilnadu, India 1991.
4. Dodge HF. A New Dual System of Acceptance Sampling, Technical Report, No.16, the Statistics Centre, Rutgers – The State University, New Brunswick, New Jersey 1967.
5. Hald A. Statistical theory of sampling inspection by attributes, Academic press, New York 1981.
6. Kaviyarasu V. Certain Results and Tables Relating to QSS-1 with Conditional RGS Plan, IAPQR Transactions, India 2008;33(1):61-70.
7. Lambert D. Zero-inflated Poisson regression with an application to defects in manufacturing. Technometrics 1992;34(1):1-14.
8. Romboski LD. An Investigation of Quick Switching Acceptance Sampling Systems, Ph.D Thesis, Rutgers-The State University, New Brunswick, New Jersey 1969.
9. Suresh KK, Latha M. Bayesian Single Sampling Plans for a Gamma Prior, Economic Quality Control 2001;16:93-107.
10. Pandey RJ. Bayesian single sampling plan by attributes with three decision criteria for discrete prior distribution." Sankhyā: The Indian Journal of Statistics, 1974;B:348-390.
11. Pradeepa Veerakumari. Certain studies relating to construction and evaluation of performance measure for Bayesian acceptance sampling plans, Ph.D thesis, BU 2009.
12. Vedaldi R. A new Criterion for the Construction of Single Sampling inspection plans by Attributes, Rivistadi Statistica Applicata 1986;19(3):235-244.