Vol-2, Issue-1 PP. 198-211 ISSN: 2394-5788

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

A Repetitive Group Sampling Plan For Truncated Life Tests Using Lomax, Burr Xii, Exponential And Generalized Exponential Distributions

Dr. Priyah Anburajan
Research Scholar,
Department of Mathematics,
Avinashilingam University,
Coimbatore, Tamil Nadu,
India

Dr. A. R. Sudamani Ramaswamy
Associate Professor,
Department of Mathematics,
Avinashilingam University,
Coimbatore, Tamil Nadu,
India

ABSTRACT

In this paper, a repetitive group acceptance sampling plan is developed for a truncated life test when the lifetime of an item follows different distributions. Sample sizes required for the acceptance numbers are determined when the consumer's risk and the test termination time are specified. The operating characteristic values according to various quality levels are obtained. The results are explained with examples.

Keywords

Lomax distribution, Burr XII distribution, exponential and generalized exponential distribution, repetitive group sampling plan, consumer's risk, Operating characteristics, Producer's risk, Truncated life test.

1. INTRODUCTION

The reputation of companies depends upon the high reliability of their products. These companies compete with each other on the basis of quality and reliability. Thus quality control has become one of the most important tools to differentiate between the competitive enterprises in a global business market. In order to control the quality of the purchased goods, two major alternatives are open to a buyer. One is the complete inspection, in which every single item in the lot is inspected and tested. This is often impractical, uneconomical or impossible. Secondly, the practical inspection in which a sample of item is taken which is inspected and tested and the whole lot is accepted or rejected depending on whether few or many defective items are found in the sample.

Acceptance sampling is plan is an essential tool in the statistical quality control and is necessary to limit the cost of inspection and is the only available method to appraise the quality in destructive testing. Acceptance sampling itself does not improve quality, but whenever the lot is rejected it indicates the instability of the production process. Acceptance sampling is a cost efficient only admissible method of destructive and efficient tests with quick results. Sampling plans are necessary to provide the disposal of defective products made, which efforts are activated to control the process.

Sherman in 1965 was the one who introduced the repetitive group sampling plan. According to him the attribute repetitive group plan is more efficient than the single sampling plan even its operation is similar to sequential sampling. Later in 1984 and 1986 Soundarajan and Ramasamy tabulated values for the selection of repetitive group sampling plan

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

indexed through (AQL, AOQL); (p_0, h_0) and (p*, h*). The study was followed by Govindaraju who established OC functions for the repetitive group sampling plans in 1987. On continuing this Subramani in 1991 studied the repetitive group sampling plan involving minimum sum of risks. Further in 1993, Suresh has constructed tables for designing repetitive group sampling plan based on the relative slopes at the points (p_1, 1-α) and (p_2, β), considering the filter and incentive effects for selection of plans. In 2004, Moon, Jun, Balamurali and Lee worked on the variable repetitive group sampling plan for minimizing average sample. Again in 2005, Moon, Jun, Balamurali and Lee along with Kim studied the designing of variable repetitive group sampling plan involving minimum average sample number. It was Balamurali and Jun again joined hands to determine the repetitive group sampling procedure for variables inspection in the year 2006. This repetitive group sampling plans is used to determine the number of groups by Aslam, Niaki, Rasool and Fallahnezhad in the year 2012. They used weibull distribution as their base parametric distribution in their approach. This is a complete different approach in repetitive group sampling. We here used the same repetitive group sampling to determine the sample size instead of determining the group. One can find that this method is far better than the other single sampling procedures due to its reduced sample sizes.Repetitive group sampling plan is not very common in life tests. This paper deals with a new method of sampling using repetitive group sampling plan and life time distributions which is very effective in reducing the sample size.

2. CUMULATIVE DISTRIBUTIVE FUNCTION

2.1 Log – Logistic distribution

The cumulative distribution function (cdf) of the Lomax distribution is given by

$$F(t/\sigma) = 1 - (1 + t/\sigma)^{-\lambda} \tag{1}$$

where σ is a scale parameter and λ is the shape parameter and it is fixed as 2.

2.2 Burr XII distribution

The cumulative distribution function (cdf) of the Burr XII distribution is given by

$$F(t/\sigma) = 1 - \left(1 + (t/\sigma)^{\gamma}\right)^{-\lambda} \tag{2}$$

where σ is a scale parameter and λ and γ are the shape parameters and it is fixed as 2.

2.3 Exponential distribution

The cumulative distribution function (cdf) of the exponential distribution is given by

$$F(t/\sigma) = 1 - e^{-t/\sigma} \tag{3}$$

where σ is a scale parameter.

2.4 Generalized Exponential Distribution

The cumulative distribution function (cdf) of the generalized exponential distribution is given by

$$F(t,\sigma) = \left(1 - e^{-\frac{t}{\sigma}}\right)^{\lambda} \qquad (4)$$

where σ is a scale parameter and λ is the shape parameter and it is fixed as 2.

If some other parameters are involved, then they are assumed to be known, for an example, if shape parameter of a distribution is unknown it is very difficult to design the acceptance sampling plan. In quality control analysis, the scale parameter is often called the quality parameter or characteristics parameter. Therefore it is assumed that the distribution function depends on time only through the ratio of t/ σ.

3. DESIGN OF THE PROPOSED PLAN

Procedure:

Sherman (1965) has introduced repetitive group sampling plan in which a sample is drawn and the number of defective is counted. According to a fixed criteria, the lot is either accepted, rejected or the sample is completely disregarded and one has to begin with a new sample in order to sentence a lot. This is continued until the fixed criterion indicates us to either accept or reject the lot.

The operating procedure for a repetitive group sampling plan is stated as follows:

1. Select a random sample of size 'n' from a lot of size 'N'.
2. Inspect all the articles included in the sample. Let 'd' be the number of defectives in the sample.
3. If $d \le c_1$, accept the lot

If $d > c_2$, reject the lot

If $c_1 < d \le c_2$, repeat the steps 1, 2 and 3.

The following is the operation characteristic function for the repetitive group sampling plan given by Sherman.

$$L(p) = \frac{p_a}{p_a + p_r} \quad ; 0 < p < 1 \qquad (5)$$

Here p_a and p_r is the binomial model and equation (1) becomes

$$L(p) = \frac{\sum_{i=0}^{c_1} \binom{n}{i} p^i (1-p)^{n-i}}{1 - \sum_{i=0}^{c_2} \binom{n}{i} p^i (1-p)^{n-i} + \sum_{i=0}^{c_1} \binom{n}{i} p^i (1-p)^{n-i}} \qquad (6)$$

Where in equation 5,

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

$$p_a = \sum_{i=0}^{c_1} \binom{n}{i} p^i (1-p)^{n-i}$$

and

$$p_r = 1 - \sum_{i=0}^{c_2} \binom{n}{i} p^i (1-p)^{n-i}$$

where p is the failure probability. These failure probabilities are the cumulative distribution function of the life time distributions.

By fixing the time termination ratios t/σ_0 as 0.628, 0.912, 1.257, 1.571, 2.356, 3.141, 3.927 and 4.712, the consumer's risk β as 0.25, 0.10, 0.05, and 0.01 and the mean ratios σ/σ_0 = 2, 4, 6, 8, 10 and 12, one can find the size of the first sample size n by substituting the failure probability p in the equations (5) and (6) and using the following inequality.

$$L(p) \leq \beta$$

The sample size generated using repetitive group sampling plan for the log – logistic, exponentiated log – logistic, Rayleigh and inverse Rayleigh distributions are presented in the Tables 1 – 4 respectively and their corresponding operating characteristic values are presented in the Tables 5 – 8 respectively.

4. NOTATION

g	-	Number of groups
r	-	Number of items in a group
n	-	Sample size
c	-	Acceptance number
t_0	-	Termination time
a	-	Test termination time multiplier
γ	-	Shape parameter
σ	-	Scale parameter
α	-	Producer's risk
β	-	Consumer's risk
p	-	Failure probability
L(*p*)	-	Probability of acceptance
μ	-	Mean life
μ_0	-	Specified life

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

Table 1: Minimum sample size *n* for RGS plan when the lifetime of the items follows the Lomax distribution

B	c_1	c_2	t/σ_0							
			0.628	0.942	1.257	1.571	2.356	3.141	3.927	4.712
0.25	0	1	3	2	2	2	2	2	2	2
	0	2	3	3	3	3	3	3	3	3
	0	3	4	4	4	4	4	4	4	4
	0	4	5	5	5	5	5	5	5	5
0.10	0	1	3	3	2	2	2	2	2	2
	0	2	4	3	3	3	3	3	3	3
	0	3	5	4	4	4	4	4	4	4
	0	4	5	5	5	5	5	5	5	5
0.05	0	1	4	3	3	2	2	2	2	2
	0	2	4	3	3	3	3	3	3	3
	0	3	5	4	4	4	4	4	4	4
	0	4	6	5	5	5	5	5	5	5
0.01	0	1	5	4	3	3	2	2	2	2
	0	2	6	4	4	3	3	3	3	3
	0	3	6	5	4	4	4	4	4	4
	0	4	7	5	5	5	5	5	5	5

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

Table 2: Minimum sample size *n* for RGS plan when the lifetime of the items follows the Burr XII distribution

β	c_1	c_2	t/σ_0							
			0.628	0.942	1.257	1.571	2.356	3.141	3.927	4.712
0.25	0	1	3	2	2	2	2	2	2	2
	0	2	4	3	3	3	3	3	3	3
	0	3	5	4	4	4	4	4	4	4
	0	4	6	5	5	5	5	5	5	5
0.10	0	1	4	3	2	2	2	2	2	2
	0	2	5	3	3	3	3	3	3	3
	0	3	6	4	4	4	4	4	4	4
	0	4	7	5	5	5	5	5	5	5
0.05	0	1	5	3	2	2	2	2	2	2
	0	2	6	4	3	3	3	3	3	3
	0	3	7	4	4	4	4	4	4	4
	0	4	7	5	5	5	5	5	5	5
0.01	0	1	8	4	3	3	3	3	3	3
	0	2	8	4	3	3	3	3	3	3
	0	3	8	5	4	4	4	4	4	4
	0	4	9	5	5	5	5	5	5	5

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

Table 3: Minimum sample size *n* for RGS plan when the lifetime of the items follows the exponential distribution

β	c_1	c_2	t/σ_0							
			0.628	0.942	1.257	1.571	2.356	3.141	3.927	4.712
0.25	0	1	4	3	2	2	2	2	2	2
	0	2	4	3	3	3	3	3	3	3
	0	3	5	4	4	4	4	4	4	4
	0	4	6	5	5	5	5	5	5	5
0.10	0	1	5	3	3	2	2	2	2	2
	0	2	5	4	3	3	3	3	3	3
	0	3	6	5	4	4	4	4	4	4
	0	4	7	5	5	5	5	5	5	5
0.05	0	1	6	4	3	3	2	2	2	2
	0	2	6	4	4	3	3	3	3	3
	0	3	7	5	4	4	4	4	4	4
	0	4	8	6	5	5	5	5	5	5
0.01	0	1	8	5	4	4	3	2	2	2
	0	2	8	6	4	4	3	3	3	3
	0	3	9	6	5	5	4	4	4	4
	0	4	9	7	5	5	5	5	5	5

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

Table 4: Minimum sample size *n* for RGS plan when the lifetime of the items follows the generalized exponential distribution

β	c_1	c_2	t/σ_0							
			0.628	0.942	1.257	1.571	2.356	3.141	3.927	4.712
0.25	0	1	8	5	4	3	2	2	2	2
	0	2	10	6	4	3	3	3	3	3
	0	3	12	7	5	4	4	4	4	4
	0	4	13	8	6	5	5	5	5	5
0.10	0	1	11	6	4	3	2	2	2	2
	0	2	12	7	5	4	3	3	3	3
	0	3	14	8	6	5	4	4	4	4
	0	4	16	9	7	5	5	5	5	5
0.05	0	1	13	7	5	4	2	2	2	2
	0	2	14	8	6	4	3	3	3	3
	0	3	16	9	6	5	4	4	4	4
	0	4	17	10	7	6	5	5	5	5
0.01	0	1	19	11	7	5	3	2	2	2
	0	2	20	11	7	5	4	3	3	3
	0	3	21	11	8	6	4	4	4	4
	0	4	22	12	8	6	5	5	5	5

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

Table 5: Probability of acceptance for RGS plans with $c_1 = 0$ and $c_2 = 2$ when the lifetime of the items follows the Lomax distribution.

β	t/σ	n	σ/σ₀					
			2	4	6	8	10	12
0.25	0.628	3	0.722752	0.962615	0.989423	0.995675	0.997831	0.998763
	0.912	3	0.388131	0.872666	0.962615	0.984731	0.992381	0.995675
	1.257	3	0.181535	0.722208	0.909767	0.962522	0.98128	0.989397
	1.571	3	0.087147	0.54647	0.828014	0.925722	0.962541	0.97875
	2.356	3	0.018703	0.219972	0.546653	0.764207	0.872509	0.92577
	3.141	3	0.00564	0.087245	0.302529	0.546745	0.722535	0.828165
	3.927	3	0.002117	0.038336	0.160149	0.353611	0.54658	0.693606
	4.712	3	0.000924	0.018703	0.087212	0.219972	0.38777	0.546653
0.10	0.628	4	0.355477	0.855797	0.956833	0.982238	0.991102	0.994937
	0.912	3	0.388131	0.872666	0.962615	0.984731	0.992381	0.995675
	1.257	3	0.181535	0.722208	0.909767	0.962522	0.98128	0.989397
	1.571	3	0.087147	0.54647	0.828014	0.925722	0.962541	0.97875
	2.356	3	0.018703	0.219972	0.546653	0.764207	0.872509	0.92577
	3.141	3	0.00564	0.087245	0.302529	0.546745	0.722535	0.828165
	3.927	3	0.002117	0.038336	0.160149	0.353611	0.54658	0.693606
	4.712	3	0.000924	0.018703	0.087212	0.219972	0.38777	0.546653
0.05	0.628	4	0.355477	0.855797	0.956833	0.982238	0.991102	0.994937
	0.912	3	0.388131	0.872666	0.962615	0.984731	0.992381	0.995675
	1.257	3	0.181535	0.722208	0.909767	0.962522	0.98128	0.989397
	1.571	3	0.087147	0.54647	0.828014	0.925722	0.962541	0.97875
	2.356	3	0.018703	0.219972	0.546653	0.764207	0.872509	0.92577
	3.141	3	0.00564	0.087245	0.302529	0.546745	0.722535	0.828165
	3.927	3	0.002117	0.038336	0.160149	0.353611	0.54658	0.693606
	4.712	3	0.000924	0.018703	0.087212	0.219972	0.38777	0.546653
0.01	0.628	6	0.070348	0.499435	0.7985	0.910566	0.954265	0.973839
	0.912	4	0.109403	0.602238	0.855797	0.938182	0.968782	0.982238
	1.257	4	0.037761	0.354824	0.693174	0.855472	0.924722	0.956727
	1.571	3	0.087147	0.54647	0.828014	0.925722	0.962541	0.97875
	2.356	3	0.018703	0.219972	0.546653	0.764207	0.872509	0.92577
	3.141	3	0.00564	0.087245	0.302529	0.546745	0.722535	0.828165
	3.927	3	0.002117	0.038336	0.160149	0.353611	0.54658	0.693606
	4.712	3	0.000924	0.018703	0.087212	0.219972	0.38777	0.546653

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

Table 6: Probability of acceptance for RGS plans with $c_1 = 0$ and $c_2 = 2$ when the lifetime of the items follows the Burr XII distribution

β	t/σ	n	σ/σ0					
			2	4	6	8	10	12
0.25	0.628	4	0.964072	0.999497	0.999957	0.999992	0.999998	0.999999
	0.912	3	0.893059	0.998521	0.999876	0.999978	0.999994	0.999998
	1.257	3	0.541492	0.991176	0.999279	0.999875	0.999968	0.999989
	1.571	3	0.191935	0.964605	0.997156	0.999514	0.999875	0.999959
	2.356	3	0.009534	0.649459	0.964652	0.994107	0.998517	0.999515
	3.141	3	0.000747	0.192301	0.805122	0.964675	0.991202	0.997162
	3.927	3	8.69E-05	0.041133	0.470445	0.863973	0.964633	0.98864
	4.712	3	1.36E-05	0.009534	0.192179	0.649459	0.892791	0.964652
0.10	0.628	5	0.910639	0.998727	0.999892	0.999981	0.999995	0.999998
	0.912	3	0.893059	0.998521	0.999876	0.999978	0.999994	0.999998
	1.257	3	0.541492	0.991176	0.999279	0.999875	0.999968	0.999989
	1.571	3	0.191935	0.964605	0.997156	0.999514	0.999875	0.999959
	2.356	3	0.009534	0.649459	0.964652	0.994107	0.998517	0.999515
	3.141	3	0.000747	0.192301	0.805122	0.964675	0.991202	0.997162
	3.927	3	8.69E-05	0.041133	0.470445	0.863973	0.964633	0.98864
	4.712	3	1.36E-05	0.009534	0.192179	0.649459	0.892791	0.964652
0.05	0.628	6	0.828487	0.997426	0.999783	0.999962	0.99999	0.999997
	0.912	4	0.650191	0.993942	0.999497	0.999912	0.999977	0.999992
	1.257	3	0.541492	0.991176	0.999279	0.999875	0.999968	0.999989
	1.571	3	0.191935	0.964605	0.997156	0.999514	0.999875	0.999959
	2.356	3	0.009534	0.649459	0.964652	0.994107	0.998517	0.999515
	3.141	3	0.000747	0.192301	0.805122	0.964675	0.991202	0.997162
	3.927	3	8.69E-05	0.041133	0.470445	0.863973	0.964633	0.98864
	4.712	3	1.36E-05	0.009534	0.192179	0.649459	0.892791	0.964652
	0.628	8	0.606812	0.992642	0.999385	0.999893	0.999972	0.999991
	0.912	4	0.650191	0.993942	0.999497	0.999912	0.999977	0.999992
	1.257	3	0.541492	0.991176	0.999279	0.999875	0.999968	0.999989
	1.571	3	0.191935	0.964605	0.997156	0.999514	0.999875	0.999959
	2.356	3	0.009534	0.649459	0.964652	0.994107	0.998517	0.999515
	3.141	3	0.000747	0.192301	0.805122	0.964675	0.991202	0.997162
	3.927	3	8.69E-05	0.041133	0.470445	0.863973	0.964633	0.98864
	4.712	3	1.36E-05	0.009534	0.192179	0.649459	0.892791	0.964652

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

Table 7: Probability of acceptance for RGS plans with c_1 = 0 and c_2 = 2 when the lifetime of the items follows the exponential distribution

β	t/σ	n	σ/σ₀					
			2	4	6	8	10	12
0.25	0.628	4	0.820135	0.979926	0.994509	0.997782	0.998894	0.999372
	0.912	3	0.821202	0.98162	0.995111	0.998052	0.999037	0.999456
	1.257	3	0.598998	0.952074	0.987499	0.995099	0.997603	0.998655
	1.571	3	0.370359	0.899832	0.973886	0.989887	0.995101	0.997271
	2.356	3	0.080917	0.65954	0.899902	0.961389	0.981594	0.989894
	3.141	3	0.017773	0.37068	0.754401	0.899936	0.95215	0.973914
	3.927	3	0.004335	0.176987	0.558862	0.797109	0.899874	0.945155
	4.712	3	0.001147	0.080917	0.370573	0.65954	0.820967	0.899902
0.10	0.628	5	0.624452	0.949268	0.986007	0.99436	0.997196	0.99841
	0.912	4	0.499527	0.926039	0.979926	0.992015	0.996065	0.99436
	1.257	3	0.598998	0.952074	0.987499	0.995099	0.997603	0.994495
	1.571	3	0.370359	0.899832	0.973886	0.989887	0.995101	0.988798
	2.356	3	0.080917	0.65954	0.899902	0.961389	0.981594	0.958727
	3.141	3	0.017773	0.37068	0.754401	0.899936	0.95215	0.973914
	3.927	3	0.004335	0.176987	0.558862	0.797109	0.899874	0.945155
	4.712	3	0.001147	0.080917	0.370573	0.65954	0.820967	0.899902
0.05	0.628	6	0.430063	0.89956	0.971637	0.988551	0.994315	0.996781
	0.912	4	0.499527	0.926039	0.979926	0.992015	0.996065	0.997782
	1.257	4	0.234552	0.819713	0.949138	0.979874	0.990164	0.994495
	1.571	3	0.370359	0.899832	0.973886	0.989887	0.995101	0.997271
	2.356	3	0.080917	0.65954	0.899902	0.961389	0.981594	0.989894
	3.141	3	0.017773	0.37068	0.754401	0.899936	0.95215	0.973914
	3.927	3	0.004335	0.176987	0.558862	0.797109	0.667297	0.945155
	4.712	3	0.001147	0.080917	0.370573	0.65954	0.499111	0.667368
0.01	0.628	8	0.179591	0.745032	0.920324	0.967284	0.983721	0.990792
	0.912	6	0.127559	0.686186	0.89956	0.95889	0.97966	0.988551
	1.257	4	0.234552	0.819713	0.949138	0.979874	0.990164	0.994495
	1.571	4	0.101736	0.667191	0.896634	0.958699	0.979884	0.988798
	2.356	3	0.080917	0.65954	0.899902	0.961389	0.981594	0.989894
	3.141	3	0.017773	0.37068	0.754401	0.899936	0.95215	0.973914
	3.927	3	0.004335	0.176987	0.558862	0.797109	0.899874	0.945155
	4.712	3	0.001147	0.080917	0.370573	0.65954	0.820967	0.899902

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

Table 8: Probability of acceptance for RGS plans with $c_1 = 0$ and $c_2 = 2$ when the lifetime of the items follows the generalized exponential distribution

β	t/σ	n	σ/σ₀					
			2	4	6	8	10	12
0.25	0.628	10	0.937814	0.998751	0.999879	0.999977	0.999994	0.999998
	0.912	6	0.908832	0.997982	0.999796	0.999961	0.999989	0.999996
	1.257	4	0.915551	0.998037	0.999795	0.999959	0.999989	0.999996
	1.571	3	0.930764	0.998362	0.999824	0.999965	0.99999	0.999996
	2.356	3	0.562673	0.985139	0.998364	0.999663	0.999902	0.999965
	3.141	3	0.173261	0.930879	0.992159	0.998365	0.999519	0.999824
	3.927	3	0.042214	0.790612	0.973746	0.994474	0.998363	0.999398
	4.712	3	0.010596	0.562673	0.93084	0.985139	0.995577	0.998364
0.10	0.628	12	0.887461	0.997688	0.999777	0.999958	0.999989	0.999996
	0.912	7	0.845106	0.996432	0.999641	0.999931	0.999981	0.999993
	1.257	5	0.801754	0.99501	0.999482	0.999898	0.999971	0.99999
	1.571	4	0.752542	0.99329	0.999287	0.999857	0.99996	0.999986
	2.356	3	0.562673	0.985139	0.998364	0.999663	0.999902	0.999965
	3.141	3	0.173261	0.930879	0.992159	0.998365	0.999519	0.999824
	3.927	3	0.042214	0.790612	0.973746	0.994474	0.998363	0.999398
	4.712	3	0.010596	0.562673	0.93084	0.985139	0.995577	0.998364
0.05	0.628	14	0.820295	0.996138	0.999629	0.99993	0.999981	0.999994
	0.912	8	0.765417	0.994237	0.999423	0.999889	0.999969	0.999989
	1.257	6	0.652878	0.989873	0.998955	0.999795	0.999943	0.99998
	1.571	4	0.752542	0.99329	0.999287	0.999857	0.99996	0.999986
	2.356	3	0.562673	0.985139	0.998364	0.999663	0.999902	0.999965
	3.141	3	0.173261	0.930879	0.992159	0.998365	0.999519	0.999824
	3.927	3	0.042214	0.790612	0.973746	0.994474	0.998363	0.999398
	4.712	3	0.010596	0.562673	0.93084	0.985139	0.995577	0.998364
0.01	0.628	20	0.559988	0.987597	0.998821	0.99978	0.99994	0.99998
	0.912	11	0.490873	0.982606	0.998274	0.99967	0.999909	0.999969
	1.257	7	0.499239	0.98206	0.998156	0.99964	0.999899	0.999965
	1.571	5	0.522618	0.982902	0.998193	0.99964	0.999898	0.999964
	2.356	4	0.207317	0.939791	0.993298	0.99863	0.999604	0.999857
	3.141	3	0.173261	0.930879	0.992159	0.998365	0.999519	0.999824
	3.927	3	0.042214	0.790612	0.973746	0.994474	0.998363	0.999398
	4.712	3	0.010596	0.562673	0.93084	0.985139	0.995577	0.998364

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

5. EXAMPLE

Assume that an experimenter wants to establish that the lifetime of the AC adapter produced in the factory ensures that the true unknown mean life is at least 1000 hours. It is desired to stop the experiment at 628 hours. It is assumed that $c_1 = 0$, $c_2 = 2$ and $\beta = 0.25$. Based on consumer's risk values and the time termination ratio, the minimum sample size is determined using the repetitive group acceptance sampling plan for truncated life test. Following are the results obtained when the lifetime of the test items follows the Lomax distribution, Burr XII distribution, exponential distribution, generalized exponential distribution, respectively.

Minimum sample size and the probability of acceptance for different lifetime distributions when $c_1 = 0$, $c_2 = 2$ and $\beta = 0.25$

Lifetime distribution	***n***	***L(p)***
Lomax	3	0.722752
Burr XII	4	0.964072
Exponential	4	0.820135
Generalized exponential	10	0.937814

From all the above distributions one can see that that Burr XII distribution is comparatively better than the other life time distribution in case of sample sizes and the probability of acceptance ($n = 4$ and $L(p) = 0.964072$) when the repetitive group sampling plan is used (from Tables 1 to 4).

6. CONCLUSION

It is observed that the sample size decreases as the time termination ratio increases. Moreover the operating characteristic values increases when the quality improves. This sampling plan can be suggested for the industrial purposes to save time and cost of the life test experiments.

7. REFERENCES

[1] Sherman R.E. (1965). Design and evaluation of repetitive group sampling plan, Technometrics, Vol. 7, pp. 11-21.

[2] Soudararajan V. and Ramasamy M. M. (1984). Designing repetitive group sampling (RGS) plan indexed by AQL and LQL: ZAPQR Transactions, Vol. 9(1), 9-14.

[3] Govindaraju, K. (1987), An interesting observations in Acceptance Sampling. Economic Quality Control Journal, 2(4), pp.89-92.

[4] Shankar, G. & Mohapatra B.N. (1993), GERT analysis of conditional repetitive group sampling plan. ZJQRM, Vol.10(2), 50-62.

GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

[5] Kantam, R.R. L., Rosaiah, K. and Srinivasa Rao, G. (2001): Acceptance sampling based on life tests: Log-logistic models. *Journal of Applied Statistics* 28, 121-128.

[6] Park H., Moon Y., Jun C.H., Balamurali S., Lee J. (2004). A variables repetitive group sampling plan for minimizing average sample number. Journal of the Korean Institute of Industrial Engineers 30 (3), 205–212.

[7] Rosaiah, K. and Kantam, R.R.L. (2005): Acceptance sampling based on the inverse Rayleigh distribution. *EQC* 20, 277-286.

[8] Rosaiah K., Kantam R.R.L., Santosh Kumar (2007). Exponentiated Log – Logistic distribution – An economic reliability test plan. *Pak. J. Statist*., Vol. 23(2) pp 147 – 156.

[9] Muhammad Aslam (2007). Double acceptance sampling based on truncated life tests in Rayleigh distribution, European Journal of Scientific Reasearch, Vol. 17 No. 4, pp. 605 – 610.

[10] Muhammad Aslam, S. T. A. Niaki, M. Rasool and M. S. Fallahnezhad (2012). Decision rule of repetitive acceptance sampling plans assuring percentile life, Scientia Iranica, Transaction E: Industrial Engineering.