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Construction of Acceptance Sampling Plans for the Median Ranked Set Sampling Using Logistic Distribution

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Abstract:
In this article Single Sampling Plan dependent on Median Ranked data plot is proposed. Two fundamental prerequisites are considered for the new arrangement: the lifetime of the test units is accepted to follow the summed up remarkable circulation; and the information are chosen by utilizing the Median Ranked Set inspecting plan from an enormous part. The appropriation work portrayal under the Median Ranked Set inspecting plan is determined expecting that the set size is known; the base number of set cycle and subsequently the base sample size is important to guarantee the predefined normal life are acquired and the working trademark upsides of the positioned examining plans just as the maker's danger are introduced. An illustrative model dependent on the outcomes acquired are given

Keywords: Median Ranked Set Sampling, Acceptance Sampling Plans, Logistic Distribution, Operating Characteristic Function Value, Producer's Risk, Consumer's Risk.

Introduction:
Ranked Set Sampling (RSS) is a new sampling structure that means to gather more delegate perceptions by spreading over the full scope of estimations in the population. This sampling structure was first proposed by MyIntyre (1952) to assess the mean of field and rummage yields as an option in contrast to the usually utilized Simple Random Sampling(SRS). Generally, the RSS is relevant in any circumstance that expects to expand the accuracy of the factual induction with minimum sample size, and it is utilized for circumstances when the genuine estimations are somewhat hard to test while ranking a little arrangement of test units outwardly is moderately simple and solid.
In this first stage, m independent Simple Random Samples (SRS), every one of size m are drawn from a given part, and afterward a free expense positioning system is utilized to rank the units inside every SRS. In the subsequent stage, the items selected systematically, to such an extent that the thing with the principal rank is chosen from the primary SRS, and afterward in the second SRS the thing with rank two is chosen, still unit with the most extreme position is chosen structure the last SRS (Takahasi and Wakimoto, 1968: Sinha et al., 1996, Chen et al., 2004). RSS can be utilized in numerous clinical, rural and conservative when the estimation of the testing units is troublesome or costly yet the plan of these units is conceivable without real estimation. Predominantly, a fascinating positioned information inspecting plans proposed by Muttlak(1997) and known by the Median Ranked Set Sampling (MRSS) will be thought of and utilized in this article. The primary benefits of MRSS are the capacity of mistake in positioning decrease and the capacity of expanding the effectiveness of the assessor. The MRSS strategy as given by Muttlak (1997) can be summarized as follows:

Step: 1 Select 'm' random sample "sets" each of size 'm' from a given population.
Step:2 Rank the items within each set with respect to a variable of interest by cost-free method.
Step:3 If the set size 'm' is odd, then select for measurement the $(\frac{m+1}{2})$ smallest rank (the median) from each set for actual measurement.

Step:4 If the set size 'm' is even, then select for measurement from the first m/2 samples, the $(m/2)^{th}$ smallest rank: and from the second m/2 samples select the $(\frac{m+1}{2})^{th}$ smallest for actual measurement.
Step:5 The cycle may be repeated 'r' times (i.e. r is number of cycles) to obtain the desired sample size n=m *r.

. Now, let $X_{11}, X_{12}, \ldots, X_{1m}; X_{21}, X_{22}, \ldots, X_{2m}; \ldots; X_{m1}, X_{m2}, \ldots, X_{mm}$ be m independent SRS each of size m; then among the m samples, select the minimum measurement unit from the first SRS and the second minimum unit from the second SRS, continuing in the same process until we select the maximum measurement unit from the last SRS for actual measurement. The element of the favored MRSS pattern will be inside the shape:

$\{X_{[m+1/2,\, m]ij};\ i= 1,2,...m,\ j=1,2,....,r\}$ m is odd

$\{X_{[m/2;m]ij},\ X_{[m+2/2;m]kj};\ i=1,2,...,m/2;\ k=m/2+1,....m,\ j= 1,2,...r\}$ m is even

The i^{th} order statistic is given by,

$\mathbf{F_{X(i)}= (F(x))^{i-1}(1-F(x))^{n-i}}, -\infty<x<\infty$
(1)

Therefore, Median Ranked Set Sampling is given by

$\mathbf{F_{MRSS(x)}= (F(x))^{m}(1-F(x))^{m}}$ (2)

Most of investigations of positioned insights have been ranked data with assessing the population mean. In any case, none of the past research thought about any of the RSS ideasin the acceptance sampling context, this article could be considered as a new contribution in this practical research area.Acceptance sampling is an important application in the quality control field, which can be considered as a test procedure, the first time the MRSS statistical procedure is used by the United State military to test bullets before shipping during the World War II. Afterward, utilized in many fields along with clinical and creation.

The technique for the old-style Acceptance Sampling Plan (ASP) in light of an SRS comprises of the resulting steps:
Step: 1 Draw an SRS of size n items from a large lot.
Step: 2 classify each item within the selected sample as defective or non-defective item.
Step: 3 if the number of defective items exceeds the acceptance number(c), then the entire lot is rejected: otherwise, it is accepted.
Therefore, in constructing any acceptance sampling plan we need to find out the minimum sample size(n) to accept a lot and the acceptance number(c), according may call the single sampling plans by ASP(n,c). Usually, with every ASP (n,c), the problem is to find the unknown parameter n and c that satisfies:

$P(X\leq c/n,p_1) = 1- \alpha$

$P(X\leq c/n,p_{2})=\beta$ (3)

Where α is the Type I error and β is the Type II error. Moreover, p_1 is the quality limit for acceptable (AQL) and p_2 is the per cent defective for lot tolerance (LTPD).The issue that we are introducing in this text is with remembering the MRSS in picking the items from a large lot assuming under the Logistic distributions. The significant idea of the utilization of MRSS in acceptance sampling context is to bring down the producer danger that ascents while the contraptions chose by means of the ordinary ASP

(n,c) essentially dependent on a SRS techniques.

Characterization of The Logistic Distribution Under MRSS:
In this portion, the appropriations could be described fundamentally dependent on the MRSS. The effect of the shape parameter on the distribution structure under MRSS using Logistic distribution.
Characterization of the Logistic Distribution for SRS:

$$\mathbf{f}(\boldsymbol{x}, \mu, \boldsymbol{s}) = \frac{e^{-(x-\mu)/s}}{s\left[1+e^{-\frac{x-\mu}{s}}\right]^2} \tag{4}$$

Characterization of the Logistic distribution for MRSS:

$$\mathbf{f_{MRSS}}(\mathbf{x}) = \left[\frac{e^{-(x-\mu/s)}}{[1+e^{-(x-\mu)/s}]^2}\right]^m \left[1 - \frac{e^{-(x-\mu/s)}}{[1+e^{-(x-\mu)/s}]^2}\right]^m \tag{5}$$

Operating Characteristic (OC) CURVE

Related with each inspecting plan there is an OC curve which depicts the exhibition of the sampling plan against great and low quality. The probability that a lot will be acknowledged under a given sampling plan which is indicated by Pa(p) and a plot of Pa(p) against given worth of part or process quality p will yield the OC curve. For unique reason designs the OC curve, a curve showing the probability of proceeding to allow the interaction to go on without change as a function of the process quality.

The curve plots the probability of accepting the lot (Pa) versus the lot fraction defective (p)

$$\mathbf{Pa} = \mathbf{P}\ \{\mathbf{d} \leq \mathbf{c}\} = \sum_{i=0}^{c} p^i (1-p)^{n-i} \tag{6}$$

Logistic distribution for MRSS will be

$$\mathbf{Pa} = \sum_{i=0}^{c} \left[\frac{e^{-(x-\mu/s)}}{s[1+e^{-(x-\mu)/s}]^2}\right]^i \left[1 - \frac{e^{-(x-\mu/s)}}{s[1+e^{-(x-\mu)/s}]^2}\right]^{(n-i)} \tag{7}$$

Table 1: The OC Curve Values for Logistic Distribution using MRSS

The given table shows the OC curve values for MRSS using Logistic distribution for N=1000, m = 50, s= 20, r= 1, 2, 3, 4, 5, 6 and n= 50, 100, 150, 200, 250 and 300.

n	**1m**	**2m**	**3m**	**4m**	**5m**	**6m**
p	**C=0**					
0.010	0.99969	0.99385	0.99079	0.98774	0.98469	0.98166
0.015	0.99949	0.98988	0.98486	0.97986	0.97489	0.96994
0.020	0.99916	0.98337	0.97516	0.96702	0.95894	0.95093
0.025	0.99862	0.97273	0.95938	0.94621	0.93322	0.92041
0.030	0.99773	0.95545	0.93392	0.91288	0.89232	0.87221
0.035	0.99626	0.92764	0.89344	0.86051	0.82879	0.79824
0.040	0.99385	0.88357	0.83054	0.7807	0.73384	0.6898
0.045	0.98992	0.81553	0.73647	0.66508	0.60061	0.54239
0.050	0.98351	0.71479	0.60432	0.51092	0.43196	0.3652
0.055	0.97319	0.57557	0.43667	0.33129	0.25134	0.19068
p	**C=1**					
0.010	0.99704	0.99397	0.99091	0.98786	0.98481	0.98178
0.015	0.99513	0.99008	0.98506	0.98006	0.97509	0.97014
0.020	0.99198	0.9837	0.97549	0.96734	0.95926	0.95125
0.025	0.98682	0.97327	0.95991	0.94673	0.93373	0.92092
0.030	0.97836	0.95632	0.93478	0.91372	0.89313	0.87301
0.035	0.96459	0.92903	0.89479	0.8618	0.83004	0.79944
0.040	0.94231	0.88576	0.8326	0.78263	0.73566	0.69151
0.045	0.90676	0.81886	0.73948	0.6678	0.60307	0.54461

0.050	0.85115	0.71961	0.60839	0.51437	0.43487	0.36766
0.055	0.76709	0.58197	0.44152	0.33497	0.25413	0.1928
p	**C=2**					
0.010	0.99717	0.99409	0.99079	0.98798	0.98494	0.9819
0.015	0.99533	0.99028	0.98526	0.98026	0.97529	0.97034
0.020	0.99232	0.98403	0.97581	0.96766	0.95958	0.95157
0.025	0.98736	0.97381	0.96044	0.94725	0.93425	0.92143
0.030	0.97925	0.95719	0.93563	0.91455	0.89395	0.87381
0.035	0.96604	0.93043	0.89613	0.8631	0.83128	0.80064
0.040	0.94465	0.88796	0.83466	0.78457	0.73749	0.69322
0.045	0.91046	0.82221	0.7425	0.67053	0.60553	0.54683
0.050	0.85688	0.72445	0.61249	0.51783	0.4378	0.37014
0.055	0.77562	0.58843	0.44642	0.33869	0.25695	0.19494

Table 1 continue..

n	**1m**	**2m**	**3m**	**4m**	**5m**	**6m**
p	**C=3**					
0.010	0.99729	0.99422	0.99115	0.9881	0.98506	0.98202
0.015	0.99553	0.99048	0.98546	0.98046	0.97548	0.97054
0.020	0.99265	0.98436	0.97614	0.96799	0.95991	0.95189
0.025	0.98791	0.97435	0.96097	0.94778	0.93477	0.92193
0.030	0.98015	0.95807	0.93648	0.91538	0.89476	0.8746
0.035	0.96749	0.93183	0.89748	0.8644	0.83253	0.80185
0.040	0.94699	0.89016	0.83673	0.78652	0.73931	0.69494
0.045	0.91418	0.82557	0.74554	0.67327	0.60801	0.54907
0.050	0.86266	0.72934	0.61662	0.52132	0.44075	0.37263
0.055	0.78423	0.59497	0.45138	0.34245	0.2598	0.19711
p	**C=4**					
0.010	0.99741	0.99434	0.99128	0.98822	0.98518	0.98214
0.015	0.99574	0.99069	0.98566	0.98066	0.97568	0.97073
0.020	0.99298	0.98469	0.97647	0.96831	0.96023	0.95221
0.025	0.98846	0.97489	0.9615	0.9483	0.93528	0.92244
0.030	0.98104	0.95894	0.93734	0.91622	0.89558	0.8754
0.035	0.96894	0.93323	0.89883	0.8657	0.83379	0.80305
0.040	0.94934	0.89236	0.83881	0.78847	0.74115	0.69667
0.045	0.91792	0.82894	0.74859	0.67602	0.61049	0.55131

0.050	0.86847	0.73425	0.62077	0.52483	0.44372	0.37515
0.055	0.79294	0.60158	0.4564	0.34625	0.26269	0.19929
p	**C=5**					
0.010	0.99753	0.99446	0.9914	0.98835	0.9853	0.98227
0.015	0.99594	0.99089	0.98586	0.98086	0.97588	0.97093
0.020	0.99331	0.98502	0.9768	0.96864	0.96055	0.95253
0.025	0.989	0.97543	0.96203	0.94883	0.9358	0.92295
0.030	0.98194	0.95981	0.93819	0.91705	0.89639	0.8762
0.035	0.9704	0.93463	0.90018	0.867	0.83504	0.80426
0.040	0.95169	0.89458	0.84089	0.79042	0.74298	0.69839
0.045	0.92167	0.83233	0.75165	0.67878	0.61299	0.55357
0.050	0.87432	0.7392	0.62496	0.52837	0.44671	0.37767
0.055	0.80175	0.60826	0.46147	0.3501	0.26561	0.20151
p	**C=6**					
0.010	0.99766	0.99459	0.99152	0.98847	0.98542	0.98239
0.015	0.99614	0.99109	0.98606	0.98106	0.97608	0.97113
0.020	0.99365	0.98535	0.97712	0.96896	0.96087	0.95285
0.025	0.98955	0.97596	0.96257	0.94935	0.93632	0.92347
0.030	0.98283	0.96069	0.93905	0.91789	0.89721	0.877
0.035	0.97186	0.93604	0.90153	0.8683	0.83629	0.80547
0.040	0.95405	0.89679	0.84297	0.79238	0.74482	0.70012
0.045	0.92544	0.83573	0.75472	0.68156	0.61549	0.55583
0.050	0.88021	0.74418	0.62917	0.53193	0.44972	0.38022
0.055	0.81066	0.61502	0.46659	0.35399	0.26856	0.20375

The following figure-1 shows the OC Curve for the acceptance number c=0, s=20, m=50, r= 1, 2, 3, 4, 5, 6 and sample size n=50, 100, 150, 200, 250 and 300.

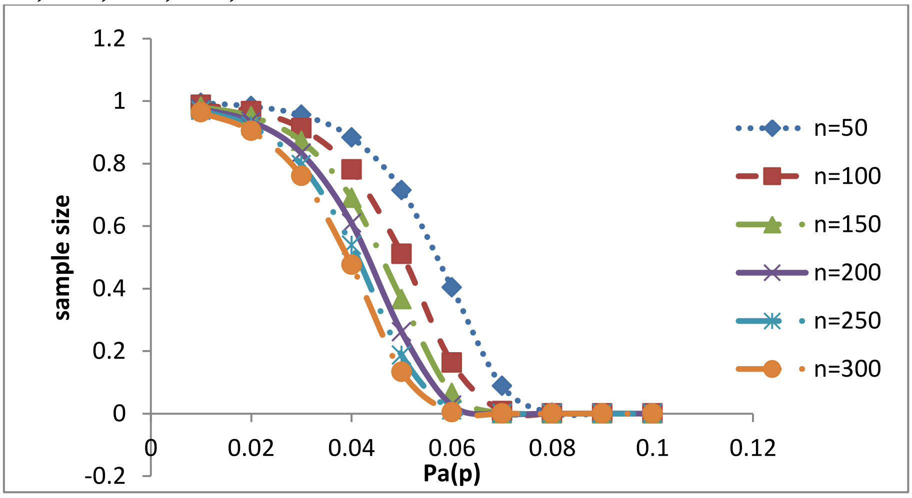

Figure 1: OC Curve for Logistic Distribution using MRSS

It shows the effect of increased sample size on OC curve. We note that each plan uses the same per cent defective which can be allowed for an acceptance lot, the OC curve becomes steeper and lies closer to the origin as the sample size increases.

Average Sample Number (ASN)

The Average Sample Number (ASN) is characterized as the normal (expected) number of sample units per lot, which is expected to show up at a choice about the acknowledgment or dismissal of the lot under the acknowledgment sampling plan. The curve drawn between the ASN and the lot quality (p) is known as the ASN curve.

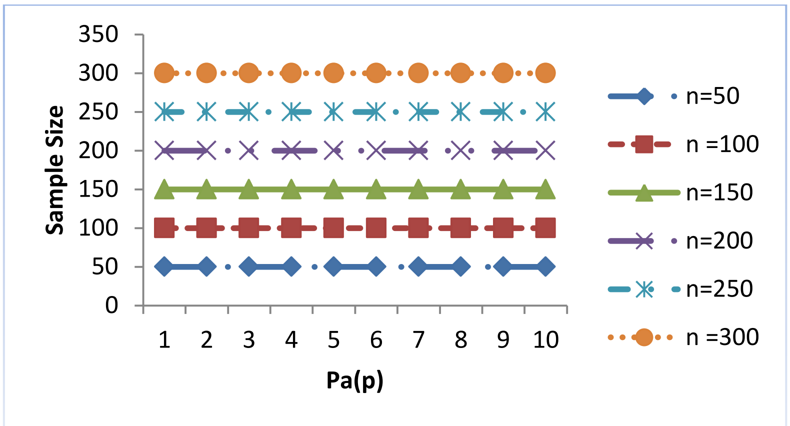

Figure 2: ASN Curve for Logistic Distribution using MRSS

In this research, ASN values (n= 50, 100, 150, 200, 250 and 300) of single sampling plan under Logistics distribution are same.

Average Outgoing Quality (AOQ)

A typical strategy, while sampling and testing is non-disastrous, is to 100 per cent review dismissed lots and supplants all defectives with great units. For this situation, all dismissed lots are made awesome and the main deformities left are those in lots that were accepted. AOQ's allude to the drawn out imperfection level for this consolidated LASP (lot acceptance sampling plan) and 100 per cent examination of dismissed lots process. In the event that all parts come in with a deformity level of precisely p, and the OC curve for the picked (n, c) LASP demonstrates a probability Pa of tolerating such a lot, for a really long time the AOQ can undoubtedly be demonstrated to be:

$$AOQ = \frac{Pa(p)(N-n)}{N} \quad (8)$$

Where N is the lot size have given expressions for AOQ to different policies adopted for single sampling attribute plans. In this research, AOQ is approximated as p * Pa(p).

Table 2: The AOQ Values for Logistic Distribution using MRSS

The given table shows the AOQ values for MRSS using Logistic distribution for N=1000, m= 50, s=20, r= 1, 2, 3, 4, 5, 6 and n=50, 100, 150, 200, 250 and 300.

n	**1m**	**2m**	**3m**	**4m**	**5m**	**6m**
p	**C=0**					
0.010	0.94971	0.89446	0.84217	0.79019	0.73852	0.68716
0.015	0.94952	0.89089	0.83713	0.78389	0.73117	0.67896
0.020	0.9492	0.88503	0.82888	0.77361	0.71921	0.66565
0.025	0.94869	0.87546	0.81547	0.75697	0.69991	0.64428
0.030	0.94784	0.8599	0.79384	0.73031	0.66924	0.61055
0.035	0.94645	0.83487	0.75943	0.68841	0.62159	0.55877
0.040	0.94416	0.79521	0.70596	0.62456	0.55038	0.48286

0.045	0.94042	0.73397	0.626	0.53207	0.45046	0.37967
0.050	0.93434	0.64331	0.51367	0.40874	0.32397	0.25564
0.055	0.92453	0.51802	0.37117	0.26503	0.1885	0.13348
p	**C=1**					
0.010	0.94719	0.89457	0.84227	0.79029	0.73861	0.68725
0.015	0.94537	0.89107	0.8373	0.78405	0.73132	0.6791
0.020	0.94238	0.88533	0.82916	0.77387	0.71945	0.66588
0.025	0.93748	0.87594	0.81592	0.75738	0.7003	0.64464
0.030	0.92944	0.86069	0.79456	0.73097	0.66985	0.61111
0.035	0.91636	0.83613	0.76057	0.68944	0.62253	0.55961
0.040	0.8952	0.79718	0.70771	0.62611	0.55175	0.48406
0.045	0.86142	0.73697	0.62856	0.53424	0.4523	0.38123
0.050	0.80859	0.64764	0.51713	0.41149	0.32615	0.25736
0.055	0.72874	0.52377	0.37529	0.26797	0.1906	0.13496
p	**C=2**					
0.010	0.94731	0.89468	0.84217	0.79038	0.7387	0.68733
0.015	0.94557	0.89125	0.83747	0.78421	0.73146	0.67924
0.020	0.9427	0.88563	0.82944	0.77413	0.71969	0.6661
0.025	0.93799	0.87643	0.81637	0.7578	0.70069	0.645
0.030	0.93029	0.86147	0.79528	0.73164	0.67046	0.61166
0.035	0.91774	0.83738	0.76171	0.69048	0.62346	0.56045
0.040	0.89742	0.79916	0.70947	0.62766	0.55311	0.48526
0.045	0.86494	0.73998	0.63113	0.53642	0.45415	0.38278
0.050	0.81404	0.65201	0.52062	0.41427	0.32835	0.2591
0.055	0.73683	0.52959	0.37946	0.27095	0.19271	0.13646

Table 2continu…

n	**1m**	**2m**	**3m**	**4m**	**5m**	**6m**
p	**C=3**					
0.010	0.94742	0.8948	0.84248	0.79048	0.73879	0.68742
0.015	0.94576	0.89144	0.83764	0.78437	0.73161	0.67938
0.020	0.94302	0.88592	0.82972	0.77439	0.71993	0.66632
0.025	0.93851	0.87691	0.81683	0.75822	0.70108	0.64535
0.030	0.93114	0.86226	0.79601	0.73231	0.67107	0.61222
0.035	0.91911	0.83864	0.76286	0.69152	0.6244	0.56129
0.040	0.89964	0.80114	0.71122	0.62921	0.55448	0.48646

0.045	0.86847	0.74301	0.63371	0.53862	0.456	0.38435
0.050	0.81952	0.6564	0.52413	0.41706	0.33056	0.26084
0.055	0.74502	0.53547	0.38368	0.27396	0.19485	0.13797
p	**C=4**					
0.010	0.94754	0.89491	0.84259	0.79058	0.73888	0.6875
0.015	0.94595	0.89162	0.83781	0.78453	0.73176	0.67951
0.020	0.94333	0.88622	0.83	0.77465	0.72017	0.66655
0.025	0.93903	0.8774	0.81728	0.75864	0.70146	0.64571
0.030	0.93199	0.86305	0.79674	0.73297	0.67168	0.61278
0.035	0.9205	0.8399	0.764	0.69256	0.62534	0.56214
0.040	0.90187	0.80313	0.71299	0.63077	0.55586	0.48767
0.045	0.87202	0.74605	0.6363	0.54082	0.45787	0.38592
0.050	0.82505	0.66082	0.52766	0.41987	0.33279	0.2626
0.055	0.7533	0.54142	0.38794	0.277	0.19702	0.13951
p	**C=5**					
0.010	0.94766	0.89502	0.84269	0.79068	0.73898	0.68759
0.015	0.94614	0.8918	0.83798	0.78469	0.73191	0.67965
0.020	0.94365	0.88652	0.83028	0.77491	0.72041	0.66677
0.025	0.93955	0.87788	0.81773	0.75906	0.70185	0.64607
0.030	0.93284	0.86383	0.79746	0.73364	0.67229	0.61334
0.035	0.92188	0.84117	0.76515	0.6936	0.62628	0.56298
0.040	0.90411	0.80512	0.71475	0.63234	0.55724	0.48887
0.045	0.87559	0.74909	0.6389	0.54303	0.45974	0.3875
0.050	0.83061	0.66528	0.53121	0.4227	0.33503	0.26437
0.055	0.76167	0.54744	0.39225	0.28008	0.19921	0.14106
p	**C=6**					
0.010	0.94778	0.89513	0.84279	0.79077	0.73907	0.68767
0.015	0.94633	0.89198	0.83815	0.78485	0.73206	0.67979
0.020	0.94397	0.88682	0.83055	0.77517	0.72065	0.66699
0.025	0.94007	0.87837	0.81818	0.75948	0.70224	0.64643
0.030	0.93369	0.86462	0.79819	0.73431	0.67291	0.6139
0.035	0.92327	0.84243	0.7663	0.69464	0.62722	0.56383
0.040	0.90635	0.80711	0.71653	0.6339	0.55862	0.49009
0.045	0.87916	0.75216	0.64151	0.54525	0.46162	0.38908
0.050	0.8362	0.66976	0.53479	0.42554	0.33729	0.26615

0.055	0.77013	0.55352	0.39661	0.28319	0.20142	0.14262

The following figure-3 shows the AOQ Curve for the acceptance number c=0, s=20, m=50, r= 1, 2, 3, 4, 5, 6 and sample size n=50, 100, 150, 200, 250 and 300.

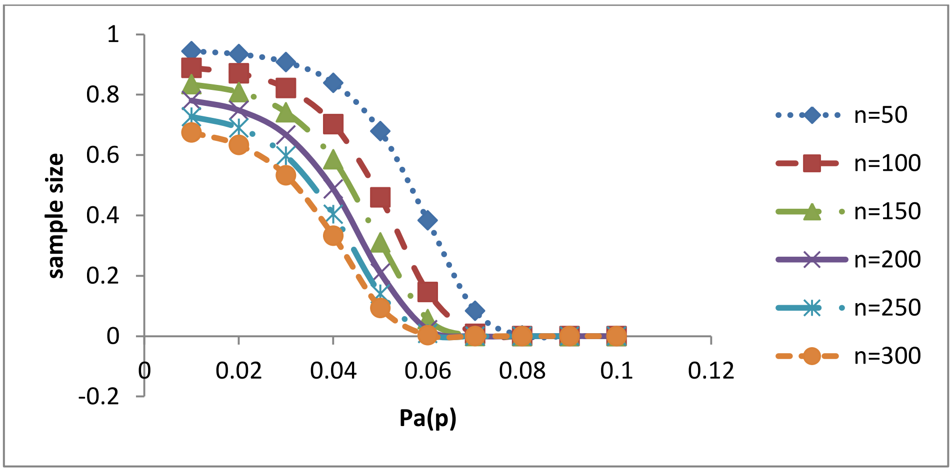

Figure 3: AOQ Curve for Logistic Distribution using MRSS

For the acceptance sampling plan in which rectification is not done, the AOQ is the same as the incoming quality. Therefore when the lot is either accepted or rejected, the AOQ is the same as the quality of the submitted lot.

Average Total Inspection (ATI)

At the point when dismissed lots are 100 per cent investigated, it is not difficult to work out the ATI if lots come reliably with a deformity level of ' p'. For a LASP (n, c) with a probability Pa of tolerating a lot with deformity level p, one can have

ATI = n + (1 - Pa) (N - n) (9)

Where N is the lot size, n is the sample size.

Table 3: The ATI Values for Logistic Distribution using MRSS

Table 3 shows the ATI values for MRSS using Logistic distribution for N=1000, m=50, s=20, r= 1, 2, 3, 4, 5, 6 and n=50,100,150, 200, 250 and 300.

n	**1m**	**2m**	**3m**	**4m**	**5m**	**6m**
p	**C=0**					
0.010	50.29298	105.536	157.8306	209.8115	261.4802	312.838
0.015	50.48292	109.1087	162.8713	216.1114	268.8327	321.0393
0.020	50.79587	114.9674	171.1155	226.3875	280.7943	334.3464
0.025	51.31125	124.5411	184.5285	243.0338	300.0865	355.7154
0.030	52.15942	140.0954	206.1644	269.6929	330.7619	389.4499
0.035	53.55356	165.1273	240.5738	311.5927	378.4077	441.2323
0.040	55.84065	204.7866	294.039	375.4426	449.618	517.1396
0.045	59.58055	266.0267	373.9983	467.9341	549.5407	620.3257
0.050	65.66381	356.6896	486.3279	591.261	676.0288	744.358
0.055	75.47357	481.9833	628.8317	734.9715	811.4987	866.5244
p	**C=1**					
0.010	52.80941	105.4256	157.7267	209.714	261.389	312.7532

0.015	54.6273	108.9275	162.701	215.9519	268.684	320.9012
0.020	57.61657	114.6705	170.8374	226.128	280.553	334.1231
0.025	62.52356	124.0569	184.0775	242.6152	299.6994	355.359
0.030	70.55578	139.3113	205.4405	269.027	330.1516	388.8931
0.035	83.64253	163.8721	239.4321	310.5577	377.4732	440.3922
0.040	104.8014	202.8155	292.2891	373.8945	448.2537	515.9427
0.045	138.5825	263.0272	371.44	465.7596	547.6997	618.774
0.050	191.4087	352.355	482.8668	588.5069	673.8459	742.6355
0.055	271.2607	476.2286	624.7084	732.0273	809.4046	865.0416
p	**C=2**					
0.010	52.69252	105.3152	157.8306	209.6165	261.2979	312.6684
0.015	54.43495	108.7462	162.5306	215.7923	268.5352	320.763
0.020	57.30043	114.3735	170.5592	225.8684	280.3117	333.8997
0.025	62.00505	123.5724	183.6262	242.1963	299.3121	355.0025
0.030	69.70824	138.5264	204.716	268.3604	329.5408	388.3359
0.035	82.26484	162.6151	238.2886	309.5212	376.5372	439.5509
0.040	102.5825	200.8394	290.5349	372.3425	446.8861	514.7429
0.045	135.062	260.0153	368.8712	463.5763	545.8513	617.216
0.050	185.9604	347.9912	479.3823	585.7343	671.6483	740.9014
0.055	263.1651	470.4101	620.5393	729.0504	807.2873	863.5424

Table 3continu…

n	1m	2m	3m	4m	5m	6m
p	**C=3**					
0.010	52.57561	105.2048	157.5188	209.5189	261.2067	312.5836
0.015	54.24255	108.5648	162.3602	215.6328	268.3863	320.6248
0.020	56.98419	114.0764	170.281	225.6087	280.0703	333.6763
0.025	61.48626	123.0877	183.1747	241.7771	298.9245	354.6457
0.030	68.85992	137.7409	203.9908	267.6933	328.9294	387.7781
0.035	80.88508	161.3561	237.1434	308.4831	375.5999	438.7083
0.040	100.358	198.8585	288.7763	370.7867	445.5151	513.54
0.045	131.5272	256.9912	366.2919	461.3841	543.9953	615.6517
0.050	180.4755	343.598	475.8744	582.943	669.4359	739.1556
0.055	254.9796	464.5268	616.3239	726.0404	805.1464	862.0265
p	**C=4**					
0.010	52.45869	105.0944	157.4148	209.4214	261.1156	312.4988

0.015	54.05012	108.3834	162.1898	215.4732	268.2375	320.4866
0.020	56.66785	113.7793	170.0027	225.3489	279.8287	333.4528
0.025	60.96719	122.6027	182.7229	241.3578	298.5368	354.2888
0.030	68.01084	136.9546	203.2649	267.0255	328.3175	387.2198
0.035	79.50325	160.0952	235.9965	307.4434	374.6611	437.8644
0.040	98.12801	196.8727	287.0133	369.2271	444.1406	512.3342
0.045	127.978	253.9547	363.7021	459.1829	542.1317	614.081
0.050	174.9536	339.1752	472.3429	580.1329	667.2085	737.398
0.055	246.7032	458.5783	612.0616	722.997	802.9818	860.4937
p	**C=5**					
0.010	52.34175	104.9839	157.3108	209.3238	261.0244	312.4139
0.015	53.85765	108.202	162.0193	215.3136	268.0886	320.3483
0.020	56.35139	113.482	169.7242	225.089	279.5872	333.2292
0.025	60.44782	122.1174	182.2709	240.9382	298.1488	353.9317
0.030	67.16097	136.1676	202.5384	266.3571	327.705	386.6611
0.035	78.11934	158.8325	234.8479	306.4022	373.721	437.0193
0.040	95.89249	194.8819	285.246	367.6635	442.7628	511.1254
0.045	124.4142	250.9057	361.1017	456.9727	540.2605	612.5038
0.050	169.3944	334.7226	468.7876	577.3038	664.9662	735.6286
0.055	238.3348	452.5636	607.752	719.9198	800.7931	858.9439
p	**C=6**					
0.010	52.2248	104.8735	157.2068	209.2262	260.9332	312.3291
0.015	53.66514	108.0206	161.8488	215.1539	267.9397	320.21
0.020	56.03484	113.1846	169.4457	224.8291	279.3455	333.0055
0.025	59.92817	121.6319	181.8186	240.5183	297.7606	353.5743
0.030	66.31033	135.3799	201.8112	265.6881	327.0919	386.1018
0.035	76.73335	157.5679	233.6975	305.3594	372.7794	436.1729
0.040	93.65143	192.8862	283.4743	366.0961	441.3816	509.9136
0.045	120.8359	247.8444	358.4906	454.7535	538.3817	610.9202
0.050	163.7979	330.24	465.2083	574.4557	662.7088	733.8473
0.055	229.8735	446.4822	603.3946	716.8084	798.5801	857.377

The following figure-4 shows the ATI Curve for the acceptance number c=0, s=20, m=50, r= 1, 2, 3, 4, 5, 6 and sample size n=50, 100, 150, 200, 250 and 300.

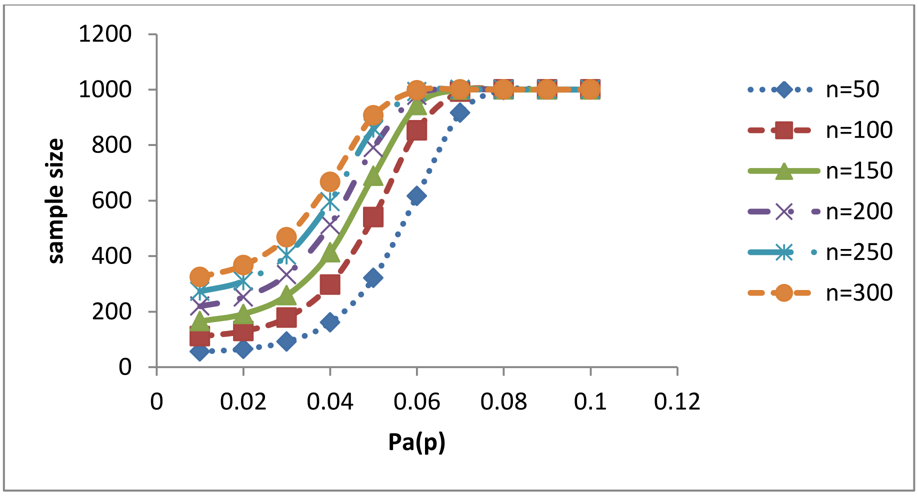

Figure 4: ATI Curve for Logistic Distribution using MRSS

The curve drawn between ATI and the lot quality (p) is known as ATI curve. A typical ATI curve for a single sample plan is shown for N= 1000, n= 50,100, 150, 200, 250 and 300.

Illustration:

A manufacturer of Furniture Company produces wooden tables in lots (N) of 1000 by using MRSS method, distributed by Logistic distribution. Then, the scale parameter (s) is 20, sample set size (m) is 50 and the cycle size (r) is 6. The quality of incoming lot is 0.03 and acceptance numbers are 0 and 1.

Explanation:

It is given, sample size of wooden tables m =50 and sample cycle size r = 6 (specified by the producer). Hence, n= m*r (300 = 50*6). For a fixed lot quality p = 0.03, the value of the parameter (s) is 20. Then $[m,r]_{ij}$ is the $(m,r)^{th}$ judgment order statistics of the i^{th} random sample of size m in the j^{th} cycle. In a sample of n=300 specimens selected from a lot of an wooden table manufacturing company, if X≤c, the lot is accepted, otherwise reject the lot and inform the management for further action. If X represents the number of defective wooden tables in the sample, if X=0 the probability of accepting the lot Pa(p) is 0.87221, ASN is 300, AOQ is 0.61055, ATI is 389 (389.44 is equivalent to 389). If X=1 the probability of accepting the lot Pa(p) is 0.87301, ASN is 300, AOQ is 0.6111, ATI is 389.

Conclusion:

Construction of Acceptance Sampling Plans for the Median Ranked Set Sampling using Logistic Distribution makes to optimize the designing process in the easy way in the determination of the parameters in the inspection quality control. Objectives of minimizing the AOQ, ASN and ATI are concerned in the optimization process.

An application has been considered in the Sampling such that AOQ, ASN or ATI is minimized subject to the probabilistic constraints considered by Guenther (1969). It was found to work very well in the process of the Operating Characteristic curve is drawn for the chosen sampling and which is more discriminating than the existing.

In this paper, another MRSS technique is recommended for considering Operating Characteristic Curve, Average Sample Number, Average Outgoing Quality and Average Total Inspection. It is more effective than basic arbitrary testing on the grounds that fewer samples should be gathered and estimated. The output of the results shows that sample size amounts decrease as indeterminacy amounts increase. It has been advised to use the proposed sampling plans, because it is cost-effective. The made arrangement may be utilized to assess huge information examination beginning with wellbeing exploration, biology and different regions that could be extended.

This study can be extended further for the various parameters such as AQL, LQL, IQL, AOQL, MAPD and MAAOQL. Further it can be extended to Double Sampling Plan, Multi-stage Sampling Plan, other Special Purpose Plans as Chain Sampling, Skip Plot Sampling Plans as well.

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