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MINIMIZING THE WAITING TIME IN AN ERLANG MARKOVIAN SINGLE SERVER ENCOURAGED ARRIVAL QUEUE WITH STOCK MARKET CONTROL CHART ANALYSIS

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Abstract: The Queuing theory is prevalent in a variety of settings, including more technical ones like manufacturing, computer networking, telecommunications, as well as everyday ones like bank counters, post offices, ticket booking sites and public transit systems. One of the major important role is the stock market industry. The primary observable performance parameters for any queuing system are the average size of the system, the length of the line, and the wait times in both the queue and the system. A stock market control chart is a graph used to monitor process evolution as well as to monitor and manage ongoing operations. We introduce the encouraged arrival in stock market control chart. The performance features of the ErlangMarkovian single server encouraged arrival queuing model is derived in this work to define control limits and examine its behaviour. In order to emphasis the uses, we provide the numerical examples and results. Little's law is also verified.

Keywords: Encouraged arrival, system size, stock market, control limit, little's law.

1. Introduction

Waiting in a queue or in a line is a common occurrence in daily life. Quantity of patrons (humans or things) waiting in line. Service providers are becoming more and more worried about how long consumers must wait in queues to receive services. Queues can develop anytime there is a greater demand for trading than there is available bandwidth on the computer systems to accommodate the trades.

For example, if you try to start a deal on a closed foreign exchange, the trade will be put on hold until the exchange reopens. For businesses to recruit new employees, make investments, and expand, markets must supply financing. They give the government money so it may use it to help pay for new highways, hospitals, and schools. An investor's stake in a corporation is represented by the phrase "stock." A stockholder, or shareholder, is someone who owns stock. The examination of system utilization time is suited to the control chart methodology. Erlang arrival queuing model has been discussed by [1]. Details of control charts used to guarantee quality in industrial industries are given in [2]. [3] Used N of the M/M/1 queuing model and the first three minutes of a random queue length to construct a control chart has been studied. [4] Using the weighted variance method for the random queue length N of the M/M/1queuing model. [5] Evaluated the M/M/1 queuing paradigm system's waiting times using a control chart. EWMA statistics are used.[6] An M/M/1/N queuing system with encouraged arrivals has been discussed. [7] Used a control chart technique to examine the quantity of consumers in an M/E_K/1 queue.[8] Evaluated the Attribute Control Charts Based on TLT for Length-Biased Weighted Lomax Distribution.

[9] studied in statistical method of the model. [10] examined in the reduction in waiting time of this model. [11] Used in emergency queuing system of this model. [12] studied in priority queue and loss precited of this model. Control chart variation and applications studied on [13,14]. Quality- management of control chart-related studied in [15]. When a market order is submitted outside of regular trading hours, it will be placed in a queue for execution the next trading day when regular trading hours resume. [That is, it may be carried out during late hours]. More information about trading during extended hours.

An analysis using Markov-state switching of volatility in stock markets and exchange rates in developing nations are studied in [16]. Examining the effects of returns and volatility on the Taiwanese and Japanese stock markets industries in [17] .Proof for stock net entropy from the rising Chinese business market studied in [18]. Predicting stock market volatility and understanding implied volatility's informational value discussed in [19]. Market volatility metrics and informational entropy studied in [20]. Research of Asian emergent stock markets' volatility and return on investment spillover effects discussed in

[21]. The Indian stock market's symmetric and asymmetric volatility is being modeled in [22].

Application of univariate GARCH models to the stock indexes of both the Bombay Stock Exchange and the National Stock Exchange studied in [23]. A research from an Indian viewpoint on anticipating stock market volatility discussed in [24]. With particular emphasis on Brazil, India, Indonesia, and Pakistan, impulsive clustering and leverage effects of the growing stock market in [25]. A Comprehensive Assessment of the Literature on Stock Market Volatility and Return Analysis studied in [26]. Control chart monitoring in stock market discussed in [27].

When the er-langMarkovian single server encouraged arrival queuing model is derived in a high number of customer's investment for particularly one product, that time applies for Encouraged arrival with Central limit, Upper control limit, and Lower control limit formula   Increased profit for company and customer side and reduced service delay. Once apply for the encouraged arrival erlang formula exactly finds out the number of customers arriving for service and how many servers are required for service.

My research hypothesis is to determine whether statistical control charts might result in an Increasing customer for a stock market trading package. To provides experiments that have been primarily focused on how to increase profits and decrease stock market wait times utilising a SSEQEA model. Single server with encouraged arrival time, find out the number of increased customers arriving, and reduce waiting time for this model, this model is to apply for Central limit, UCL, and LCL in the stock market industry increasing profit for customers and the company. Additionally reduced waiting time and reduced loss of money, Why because I choose the erlang model with a single server in this case, a more effective result was provided compared to other models. The skewed control chart classifies the CL, UCL, and LCL. This control chart is used for statistical analysis of the Stock market industry. When applying encouraged arrival under the control chart the number of customers increased compared to the Poisson arrival model. Little's law also satisfied for this model.

Erlang distribution is a particular case of the gamma distribution model. The distribution is used in all engineering fields, queuing models, mathematical biology, and many other fields to model a variety of real-world applications.

The market for the acquisition and sale of existing securities is known as the secondary market, commonly referred to as the stock market or stock exchange. Securities are not directly issued by the corporation to investors on the secondary market. Existing investors offer the securities for sale to new investors.

Exchange-traded funds (ETFs), stock index and stock options, equity swaps, single-stock futures, and stock index futures are a few examples. These final two may be traded over-the-counter or on futures exchanges, which are separate from stock exchanges and have a history that may be traced back to commodities futures markets. Stock markets assist businesses in raising funds by allowing them to trade openly. It serves as a marketplace for the acquisition and sale of securities.

A graph used to examine how a process evolves over time is the control chart. The data are plotted according to time. An average line in the middle, an upper line for the upper control limit, and a lower line for the lower control limit are always included on a control chart. These curves were created using historical data.

Through a steady-state situation, this study aims to maximize a number of SSEQEA model parameters, including the encouraged arrivals in stock market central limit, – control limit, and lower control limit customers

2. Single-server Erlang queue with encouraged arrival (SSEQEA) model description

Equations now we describe the single-server Erlang queue with encouraged arrival (SSEQEA) model as follows:

Consider an encouraged arrival queuing system in which an encouraged arrival must pass through l phases with a mean time of $\frac{1}{l(1+\eta)}$. Encouraged arrival means may produce a significant rush in the system, stressing the few available service facilities and leaving customers disappointed, who then rejoin the line to wait for satisfying service completion.

Each before being admitted to the service. In this system, the inter-arrival times follow k-Erlang distribution with a mean of $\frac{1}{\lambda(1+\eta)}$.,where$\eta(encouraged\ arrival)$ is the percentage change in the number of customers determined from the prior or clear vision. For instance, if a company had previously offered discounts and there had been a 10% shift in the number of customers, then η = 0.1, respectively. Service times have an exponential distribution with mean$\frac{1}{\mu}$.

Let p_n represent the probability that there are n customers in the Single –server Erlang queue with encouraged arrival queuing system. Then

$$p_n = \sum_{j=nl}^{nl+l-1} p_j^{(p)} \qquad (1)$$

Where, the probability that phase j will be completed, which is denoted by $p_j^{(p)}$.

$$p_j^{(p)} = \frac{l\lambda(1+\eta)p_0^{(p)}}{\mu} r_0^{j-l} (j \geq l) \qquad (2)$$

Where the root of the characteristic equation is $r_0 \epsilon (0,1)$

$$\mu z^{l+1} - (l\lambda(1+\eta) + \mu)z + l\lambda(1+\eta) = 0$$

Since $p_0^{(p)} = \frac{1-r_0}{l}$, equation (2) becomes,

$$p_j^{(p)} = \frac{\lambda(1+\eta)}{\mu}(1-r_0)r_0^{j-l}$$

As a result, equation (1) becomes.

$$p_n = \frac{\lambda(1+\eta)}{\mu}(1-r_0)(r_0^l)^{n-1}$$

Where p_n is probability distribution function of nthterm

2.1. Number of people in the line.

This section provides the control chart analysis of the Single –server Erlang queue with encouraged arrival model.

We assume, L_q represent the number of people in the line(Queue).

The anticipated number of people in the line(Queue),denoted by E (L_q) and is given by:

$$E(L_q) = \sum_{n=1}^{\infty} (n-1)p_n$$

$$= \frac{\frac{\lambda(1+\eta)}{\mu} r_0^l}{(1-r_0^l)} \qquad (3)$$

and

$$E(L_q^2) = \sum_{n=1}^{\infty} p_n (n-1)^2$$

$$= \frac{\frac{\lambda(1+\eta)}{\mu} r_0^l (1 + r_0^l)}{(1 - r_0^l)^2}$$

Variance of L_q dented by Var(L_q)is given by:

$$\text{Var}\ (L_q) = \text{E}\ (\ {L_q}^2) - (E\ (L_q))^2$$

$$= \frac{\frac{\lambda(1+\eta)}{\mu} r_0^l (1 + r_0^l - \frac{\lambda(1+\eta)}{\mu} r_0^l)}{(1 - r_0^l)^2} \qquad (4)$$

Under the concept that the number of customers in the queue follows a gamma distribution, the upper control limit (UCL), central limit (CL), and lower control limit (LCL) of the stock market control chart are provided by

$$Upper\ Control\ Limit = \frac{\frac{\lambda(1+\eta)}{\mu} r_0^l}{\left(1 - r_0^l\right)} + 3\sqrt{\frac{\frac{\lambda(1+\eta)}{\mu} r_0^l \left(1 + r_0^l - \frac{\lambda(1+\eta)}{\mu} r_0^l\right)}{\left(1 - r_0^l\right)^2}} \qquad (5)$$

$$Central\ Limit = \frac{\frac{\lambda(1+\eta)}{\mu} r_0^l}{\left(1 - r_0^l\right)} \qquad (6)$$

$$Lower\ Control\ Limit = \frac{\frac{\lambda(1+\eta)}{\mu} r_0^l}{(1 - r_0^l)} - 3\sqrt{\frac{\frac{\lambda(1+\eta)}{\mu} r_0^l \left(1 + r_0^l - \frac{\lambda(1+\eta)}{\mu} r_0^l\right)}{\left(1 - r_0^l\right)^2}}\} \qquad (7)$$

The stock market control chart's parameters are as follows using (3) and (4) in (5, 6,7)

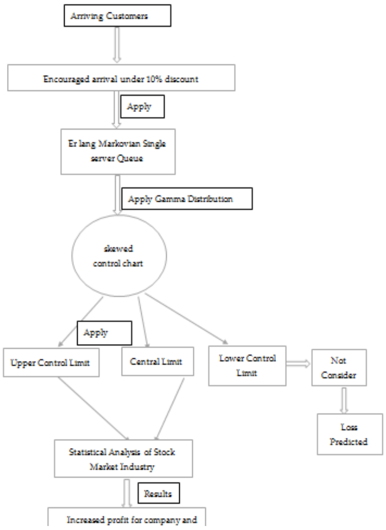
$$\text{Upper Control Limit} = \frac{\frac{\lambda(1+\eta)}{\mu} r_0^l + 3\sqrt{\frac{\lambda(1+\eta)}{\mu} r_0^l (1 + r_0^l - \frac{\lambda(1+\eta)}{\mu} r_0^l)}}{(1 - r_0^l)}$$

$$\text{Central limit} = \frac{\frac{\lambda(1+\eta)}{\mu} r_0^l}{(1 - r_0^l)}$$

$$\text{Lower Control Limit} = \frac{\frac{\lambda(1+\eta)}{\mu} r_0^l - 3\sqrt{\frac{\lambda(1+\eta)}{\mu} r_0^l (1 + r_0^l - \frac{\lambda(1+\eta)}{\mu} r_0^l)}}{(1 - r_0^l)}$$

2.2. Working model

This section deals the working model of the Single –server Erlang queue with encouraged arrival



2.3. Anticipated number of customers in the system

This section discusses the anticipated number *of customers in the system* of the Single–server Erlang queue with encouraged arrival.

Let L_s represent the number of customers in the system.

The anticipated number of customers in the system denoted by E (L_s) and is given as follows:

E (L_s)=$\sum_{n=1}^{\infty} np_n$

$$= \sum_{n=1}^{\infty} n \frac{\lambda(1+\eta)}{\mu}(1-r_0^l)(r_0^l)^{n-1}$$

$$\mathrm{E}(L_s)= \frac{\frac{\lambda(1+\eta)}{\mu}}{(1-r_0^l)} \qquad (8)$$

and

$$\mathrm{E}\left({L_s}^2\right)=\sum_{n=1}^{\infty} p_n (n)^2$$

$$=\frac{\lambda(1+\eta)}{\mu}(1-r_0^l)\sum_{n=1}^{\infty}(n)^2(r_0^l)^{n-1}$$

$$=\frac{\frac{\lambda(1+\eta)}{\mu}(1+r_0^l)}{(1-r_0^l)^2}$$

Variance of L_s is

$$\text{Var}\,(L_s) = \text{E}\,({L_s}^2) - (E\,(L_s))^2$$

$$= \frac{\frac{\lambda(1+\eta)}{\mu}\left(1+r_0^l-\frac{\lambda(1+\eta)}{\mu}\right)}{(1-r_0^l)^2} \qquad (9)$$

Under the concept that the number of customers in the system follows a gamma distribution, the upper control limit (UCL), central limit (CL), and lower control limit (LCL) of the Stock market control chart are provided by

$$Upper\ Control\ Limit = \frac{\frac{\lambda(1+\eta)}{\mu}}{(1-r_0^l)} + 3\sqrt{\frac{\frac{\lambda(1+\eta)}{\mu}\left(1+r_0^l-\frac{\lambda(1+\eta)}{\mu}\right)}{(1-r_0^l)^2}} \qquad (10)$$

$$Central\ Limit = \frac{\frac{\lambda(1+\eta)}{\mu}}{(1-r_0^l)} (11)$$

$$Lower\ Control\ Limit = \frac{\frac{\lambda(1+\eta)}{\mu}}{(1-r_0^l)} - 3\sqrt{\frac{\frac{\lambda(1+\eta)}{\mu}\left(1+r_0^l-\frac{\lambda(1+\eta)}{\mu}\right)}{(1-r_0^l)^2}}\} \qquad (12)$$

The stock market control chart's parameters are as follows using (8) and (9) in (10, 11, 12)

$$\text{Upper Control Limit}=\frac{\frac{\frac{\lambda(1+\eta)}{\mu}}{(1-r_0^l)}+3\sqrt{\frac{\lambda(1+\eta)}{\mu}(1+r_0^l-\frac{\lambda(1+\eta)}{\mu})}}{(1-r_0^l)}$$

$$\text{Central limit}=\frac{\frac{\lambda(1+\eta)}{\mu}}{(1-r_0^l)}$$

$$\text{Lower Control Limit}=\frac{\frac{\frac{\lambda(1+\eta)}{\mu}}{(1-r_0^l)}-3\sqrt{\frac{\lambda(1+\eta)}{\mu}(1+r_0^l-\frac{\lambda(1+\eta)}{\mu})}}{(1-r_0^l)}$$

2.4. Elapsed time in the line (Queue)

This section deals about the Elapsed time in the line (Queue)of the Single –server Erlang queue with encouraged arrival.

The customer's waiting time distribution denoted by$W_q(t)$ and is provided below:

$$W_q(t) = \mu r_0^l(1 - r_0^l)e^{-\mu(1-r_0^l)t}$$

$$, t \geq 0$$

The average for W_q is

E(W_q)=

$$\mu r_0 l(1 - r_0 l)\int_0^\infty te^{-\mu(1-r_0 l)t}dt$$

$=\frac{r_0^l}{\mu(1-r_0^l)}$ (13)

and

E($W_q{}^2$)=

$$\mu r_0 l(1-r_0 l)\int_0^{\infty} t^2 e^{-\mu(1-r_0 l)t}\,dt$$

$= \frac{2r_0^l}{\mu^2(1-r_0^l)^2}$

Now, the variance of W_q is given by,

Var (W_q) = E ($W_q{}^2$) - $\{E\ (W_q)\}^2$

$= \frac{r_0^l(1-2r_0^l)}{\mu^2(1-r_0^l)^2}$ (14)

When assuming that the waiting times of customers in a line follow a gamma distribution, the parameters of a stock market control chart are provided by

$$Upper\ Control\ Limit = \frac{r_0^l}{\mu(1-r_0^l)} + 3\sqrt{\frac{r_0^l(2-r_0^l)}{\mu^2(1-r_0^l)^2}}$$

(15)

$$Central\ Limit = \frac{r_0^l}{\mu(1-r_0^l)}$$ (16)

$$Lower\ Control\ Limit = \frac{r_0^l}{\mu(1-r_0^l)} - 3\sqrt{\frac{r_0^l(2-r_0^l)}{\mu^2(1-r_0^l)^2}}\}$$

(17)

The stock market control chart's parameters are as follows using (13) and (14) in (15, 16, 17)

Upper Control Limit=$\frac{r_0^l+3\sqrt{r_0^l(2-r_0^l))}}{\mu(1-r_0^l)}$

Central limit=$\frac{r_0^l}{\mu(1-r_0^l)}$

Lower Control Limit=$\frac{r_0^l+3\sqrt{r_0^l(2-r_0^l)}}{\mu(1-r_0^l)}$

2.5. Elapsed time in the system

This section provides the elapsed time in the system of the Single – server k-Erlang queue with encouraged arrival.

Let W_s denotes the customer's elapsed time in the system**.**

The system's predicted customer's waiting time, E (W_s), is given by

$$E(W_s) = \frac{E(L_s)}{\lambda(1+\eta)}$$

$$\frac{\frac{\lambda(1+\eta)}{\mu}}{\lambda(1+\eta)(1-r_0^l)} \qquad (18)$$

The variance of W_s is also provided by

$$var(W_s) = \frac{var(L_s)}{(\lambda(1+\eta))^2}$$

$$= \frac{\frac{\lambda(1+\eta)}{\mu}(1+r_0^l-\frac{\lambda(1+\eta)}{\mu})}{(\lambda(1+\eta))^2((1-r_0^l))^2} \quad (19)$$

If the waiting times for customers in the system follow a gamma distribution, the parameters of the stock market control chart are provided by

$$Upper\ Control\ Limit = \frac{\frac{\lambda(1+\eta)}{\mu}}{\lambda(1+\eta)(1-r_0^l)} + 3\sqrt{\frac{\frac{\lambda(1+\eta)}{\mu}\left(1+r_0^l-\frac{\lambda(1+\eta)}{\mu}\right)}{\left(\lambda(1+\eta)\right)^2((1-r_0^l))^2}} \ (20)$$

$$Central\ Limit = \frac{\frac{\lambda(1+\eta)}{\mu}}{\lambda(1+\eta)\left(1-r_0^l\right)} \qquad (21)$$

$$Lower\ Control\ Limit = \frac{\frac{\lambda(1+\eta)}{\mu}}{\lambda(1+\eta)(1-r_0^l)} - 3\sqrt{\frac{\frac{\lambda(1+\eta)}{\mu}\left(1+r_0^l-\frac{\lambda(1+\eta)}{\mu}\right)}{\left(\lambda(1+\eta)\right)^2((1-r_0^l))^2}}\ \}$$

(21)

The stock market control chart's parameters are as follows using (18) and (19) in (20, 21, 22)

$$\text{Upper Control Limit}=\frac{\frac{\lambda(1+\eta)}{\mu}+3\sqrt{\frac{\lambda(1+\eta)}{\mu}(1+r_0^l-\frac{\lambda(1+\eta)}{\mu}))}}{\lambda(1+\eta)(1-r_0^l)}$$

$$\text{Central limit}=\frac{\frac{\lambda(1+\eta)}{\mu}}{\lambda(1+\eta)(1-r_0^l)}$$

$$\text{Lower Control Limit}=\frac{\frac{\lambda(1+\eta)}{\mu}-3\sqrt{\frac{\lambda(1+\eta)}{\mu}(1+r_0^l-\frac{\lambda(1+\eta)}{\mu}))}}{\lambda(1+\eta)(1-r_0^l)}$$

3. Numerical Tables

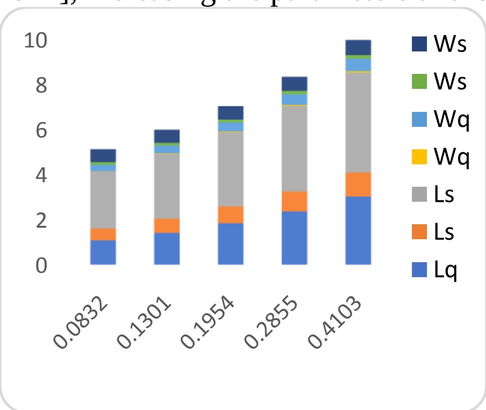
The performance of the queuing system is examined numerically in relation to the parameters$\lambda(1+\eta), l\ and\ \mu$. Since LCL values for the chosen parameter values are negative, they are treated as zero and are not displayed in the table as a distinct column. The stock market control chart settings for the number of customers in the queue are provided in the table. Number of users, average length of time users waits in line and customers wait times in the system for certain chosen values$\lambda(1+\eta), l$ *and* μ. ηrepresent discount value 10% of the table and figure using MATLAB software.

Table 1. We provide increase in the encouraged arrival rate $\lambda(1+\eta)$, 10% discount er-lang Markovian single server stock market Control chart in the queuing system with parameters for the control chart for L_q,L_s, W_q, W_s.

λ	$\lambda(1+\eta)$	μ	l	$\frac{\lambda(1+\eta)}{\mu}$	r_0	L_q		L_s		W_q		W_s	
						CL	UCL	CL	UCL	CL	UCL	CL	UCL
4	4.4			0.4400	0.7690	0.0832	1.0680	0.5232	2.5297	0.0189	0.2808	0.1189	0.5749
4.5	4.95	10	7	0.4950	0.7991	0.1301	1.4081	0.6251	2.8757	0.0263	0.3359	0.1263	0.5809
5	5.5			0.5500	0.8259	0.1954	1.8276	0.7454	3.2898	0.0355	0.3973	0.1355	0.5981
5.5	6.05			0.6050	0.8500	0.2855	2.3495	0.8905	3.7957	0.0472	0.4670	0.1472	0.6274
6	6.6			0.6600	0.8720	0.4103	3.0122	1.0703	4.4319	0.0622	0.5492	0.1622	0.6715

λ	μ	l	η
4,4.5,5,5.5,6	10	7	0.1 *or* 10%

In (Table 1) increase in the encouraged arrival rate $\lambda(1+\eta)$, (whereη represents the value of the discount) In comparison to the Poisson process [in ref 7], increasing the parameters and UCL for fixed values of and l



In the (Figure 1) represent increase encouraged arrival 10% discounts parameters for the stock market control chart for L_q,L_s, W_q, W_s.increase in the encouraged arrival rate $\lambda(1+\eta)$, (whereη represents the value of the discount) increasing the parameters and UCL for fixed values of and l [in ref 7].

Table 2.we provide Little's law verification values

$\lambda(1+\eta)$	CL values $L_s = \lambda(1+\eta)W_s$	UCL values $L_s = \lambda(1+\eta)W_s$
4.4	0.5232	2.5297
4.95	0.6251	2.8757
5.5	0.7454	3.2898
6.05	0.8905	3.7957
6.6	1.0703	4.4319

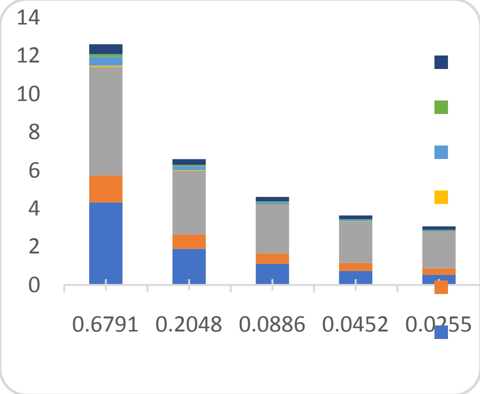
Table 3 We provide Encouraged arrival 10% discount and increase in the service rate μ, E_k/M/1 stock market Control chart in the queuing system

λ	μ	l	η
10	15,20,25,30,35	6	0.1 or 10%

λ	$\lambda(1+\eta$	μ	l	$\frac{\lambda(1+}{\mu}$	r_0	L_q		L_s		W_q		W_s	
						CL	UCL	CL	UCL	CL	UCL	CL	UCL
10	11	15	6	0.7333	0.8851	0.6791	4.3232	1.4124	5.6902	0.0617	0.4675	0.1284	0.5173
10	11	20		0.5500	0.8046	0.2048	1.8895	0.7548	3.3479	0.0186	0.2040	0.0686	0.3044
10	11	25		0.4400	0.7425	0.0886	1.1120	0.5286	2.5676	0.0081	0.1162	0.0481	0.2334

10	11	30		0.3667	0.6920	0.0452	0.7446	0.4119	2.1711	0.0041	0.0745	0.0374	0.1974
10	11	35		0.3143	0.6496	0.0255	0.5367	0.3398	1.9260	0.0023	0.0512	0.0309	0.1751

In (Table 3) comparison to the Poisson process [in ref 7]. when the service rateμ is increased, the parameters CL and UCL also diminish.



In the (Figure 2) represent Increase service rate with 10% discounts parameters for the stock market control chart for L_q,L_s, W_q, W_s.the service rateμ is increased, the parameters CL and UCL also diminish [in ref 7],

Table: 4 We provide Little's law verification values

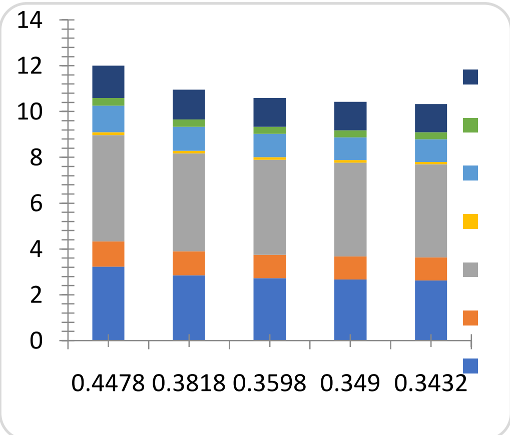
$\lambda(1+\eta)$	CL values $L_s = \lambda(1+\eta)W_s$	UCL values $L_s = \lambda(1+\eta)W_s$
11	1.4124	5.6902
11	0.7548	3.3479
11	0.5286	2.5676
11	0.4119	2.1711
11	0.3398	1.9260

Table 5 We provide Encouraged arrival 10% discount and increase in the number of phases$l$.E_k/M/1 stock market Control chart

λ	μ	l	η
3	5	5,10,15,20,25	0.1 *or* 10%

λ	$\lambda(1+\eta$	μ	L	$\frac{\lambda(1+}{\mu}$	r_0	L_q		L_s		W_q		W_s	
						CL	UCL	CL	UCL	CL	UCL	CL	UCL
3	3.3	5	5	0.6600	0.8343	0.4478	3.2216	1.1078	4.6368	0.1357	1.1574	0.3357	1.4051
3	3.3	5	10	0.6600	0.9045	0.3818	2.8519	1.0418	4.2756	0.1157	1.0523	0.3157	1.2956
3	3.3	5	15	0.6600	0.9329	0.3598	2.7269	1.0198	4.1542	0.1090	1.0161	0.3090	1.2588
3	3.3	5	20	0.6600	0.9483	0.3490	2.6655	1.0090	4.0947	0.1058	0.9981	0.3058	1.2408
3	3.3	5	25	0.6600	0.9580	0.3432	2.6324	1.0032	4.0626	0.1040	0.9883	0.3040	1.2311

(Table 5) when compared to a Poisson process [in ref 7], an increase in the number of phases$l$ results in greater decreases in the parameters CL and UCL



In the (Figure 3), represent increase phases with 10% discounts parameters for the stock market control chart for L_q,L_s, W_q, W_s ,an increase in the number of phases$l$ results in greater decreases in the parameters CL and UCL [in ref 7].

Table 6 We provide Little's law verification values

$\lambda(1+\eta)$	CL values $L_s = \lambda(1+\eta)W_s$	UCL values $L_s = \lambda(1+\eta)W_s$
3.3	1.1078	4.6368

3.3	1.0418	4.2756
3.3	1.0198	4.1542
3.3	1.0090	4.0947
3.3	1.0032	4.0626

4. Conclusions:

This model has real usesin industries such as manufacturing, telephone and computer networks. One of the major important role in stock market industry is to maximize the system size. The control chart demonstrate that the stock prices and participation rates are typically in the range between the UCL and LCL. This article provides experiments that have been primarily focused to increase the profits and to reduce the stock market waiting time by using the single server Erlangian queue with encouraged arrival (SSEQEA) model. The skewed control chart is applied for the component firms of London Stock Exchange Group (LSEG). We have focused more on, how to increase profits and decrease stock market wait times utilizing a (SSEQEA) model. According to (Table 1, 3 and 5),if encouraged arrivals are discounted by 10%, there are more arrivals than in a Poisson arrival process [in ref 7]. In this model the maximum system size has increased and the waiting time has reduced. We have provided the working model. we have shown that a stock market industry that has less customers will get more customers and become financially strong by providing a discount of 10%. Future studies will be on the movable and immovable properties and economic cost details can be analyzed.

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