

Architectural Manifestation of Outdoor Theatre

Simran Shekhar (M. Arch)

RAJIV KACKER - Associate Professor Head of Department,

Faculty of Architecture and Planning, Dr. A. P. J. Abdul Kalam Technical University, TagoreMarg , C.S.I.R. Colony ,Mukarimnagar , Hasan Ganj , Lucknow, Uttar Pradesh 226007

Abstract -Architectural manifestation throws light on Outdoor theatre that has a great impact on public and private life due to Sound exposure and Noise pollution in outdoor premises. This dissertation aims at democratization of theatre industry which is flexible and convertible in post Covid times bringing impact of climate on outdoor Theatre as a matter of Comfort and emergency planning. World Health Organization Report says that Noise pollution works harder on physical and mental health. Theatre industry has yet to produce a universally accepted solution of relevant theatre problem .The subject of this research is to find best possible solution of an Outdoor theatre which is determined by environment friendly aspect where people and things can interact more efficiently and safely along with the sound quality gentle and acoustic .It is very important to know how Sound is transmitting in the open space with the build environment and syncing with the adverse climatic effects This research paper follows final results measured in EASE software which will help in concluding best theatre seating layout style limited to shape , analyzed on the account of maximum frequency range achieved with standard sound distribution in the Outdoor theatre world . Each design takes into accounteconomically , socially , user needs and Environmental factors .

Keywords:- Theatre Industry , Acoustic , Environment , Seating , Spectators .

I. INTRODUCTION

Study of Architecture is a delegation to interpersonal relationship ([1]). It demands firsthand experience by actual involvement around it. We can understand through pictures but at the same time it can be misunderstood. Theoretical interpretations are just an information, only experience gathered through visiting the place is the right intention to go into the pulse of the building. It is true because the building exhibits and preserves the very soul of human knowledge and perspective. Knowing about its contextual usage along with the design plan we understand the very existence of the building. Building of any particular age is the replica of culture and tradition of that time. It not only reveals the past but also presents an example to futuristic approach. It is a continuous process of preserving and inventing of the built environment in various perspectives. To be true, an architect is expected to be futuristic in bringing together past insight into present and future.

Life depicts diversified experiences. If we look into Darwin's Theory of Evolution which discovers that insects bring cross pollination of flowers otherwise plants would be

limited to self-fertilization of unvarying clones. Due to biological diversity, plants adapt changing climate similarly Architectural diversity empowers human ability to be receptive to the changing needs of the society and its manifestations.

Historical theatres are still utilized for a range of cultural events today, virtual models have been tweaked to mimic the acoustic circumstances by adding particular visual aspects to the theatre or inserting the presence of the crowd in the virtual modelcavea in order to assess their impact on acoustic quality.

However, this paper reflects never ending efforts to create places generating curiosity to bring up community activity. These shared human motives -nomatter how do they appear on physical space ; they surely are significant as a mechanism to architectural design .In changing times, they exhibit future by preserving the cultural insight into past.

My vocation simply is to enhance visitors experience rather than establishing my architectural expertise as an architect. It is to create an environment where public can muse over it and can believe in the truthfulness ofthe architecture that has woven so many human storieswith continuous insight into culture.

➤ Background

Design of outdoor theatres has been changed in recent years due to variety of factors including changingaudience, expectation, increased entertainmentcompetition, the rise of digital content and weather concerns. The physical location, as well as the front- of-house and backstage support spaces are also significant. The writer points out that the open stage and Amphitheatre, which were popular in historical outdoor dramas in the mid-twentieth century, are having trouble surviving in today's entertainment climate. These theatres were generally built for specific plays, are difficult to convert to other types ofentertainment, and are vulnerable to weather, which can result in performance cancellations and revenue loss. The writers point out that covering the entire Amphitheatre or a portion of it protects the spectators (and box office income).

➤ Context

Many outdoor theatres across the world still use the Greco- Roman concept, but with modern improvements to meet the needs of today's audiences and theatre technology ([2]). For sheltering purposes there is a pavilion at rooftop with other facilities like lavatories ,stage lighting and technical control booths . Lighting towers are built for lighting the instruments by the sides of seating area . The stage construction might be on Roman style or Packed sand .

Backstage area may be basic or as per the requirement of the theatre comprising of dressing room, rehearsal rooms, shoppingoutlets, Storage areas and such other utility rooms . Modern amphitheaters follow the ancient predecessors in building natural slopes.

➤ *Aim*

Researcher aims at democratization of theatreindustry which is flexible and convertible by exploring Acoustic Application based performance design building.

➤ *Objective*

Main objective is to adapt creative ways to relive cultural activities through present Garden Theatres and Ancient Roman Theatres. Also , to investigate outdoor theatres in content to speech intelligibility , decaycurve , Impulse response , ST (early) , ST (Late) , range of sound distribution and maximum frequency range to be achieved . This will help to find out best possible architectural solutions by achieving the character & place. Outdoor theatre is a complete studyof natural material, acoustic sound distribution and seating layout arranged in respect to the facilities provided by nature. Theatres that are close to nature are always appreciated and accepted by the public ([3]).

II. PERFORMER – AUDIENCE RELATIONSHIP

This research focuses on how to provide a high- quality audience experience while also educating them about the dangers of prolonged exposure to dangerous soundpressure levels ([4]). The next step is to look at average audience expectations regarding audio quality.

Audiences become expressive when actors offer their experiences. It is the most fundamental relationship between the actor and the audience. Hence, Theatricalperformances are educational.

➤ *Sense of Comfort in Theatre*

An architect faces many challenges to prove his singularity of work due to different geographical locations and dimensional differences. In order to create perfect harmony an aesthetic and acoustic synchronization is needed . Greek architecture emphasizes on special seating arrangements for specialaudience ([5]) .

III. DATA ANALYSIS

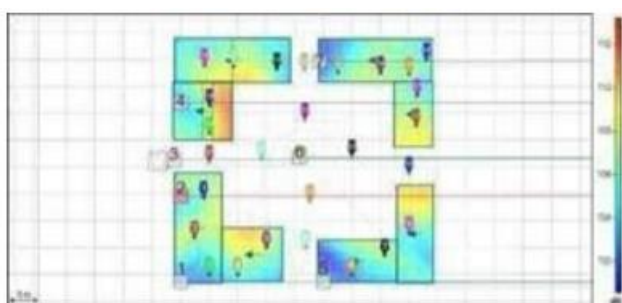


Fig 1 : Plan of Outdoor theatre In Kala Kendra , Jaipur

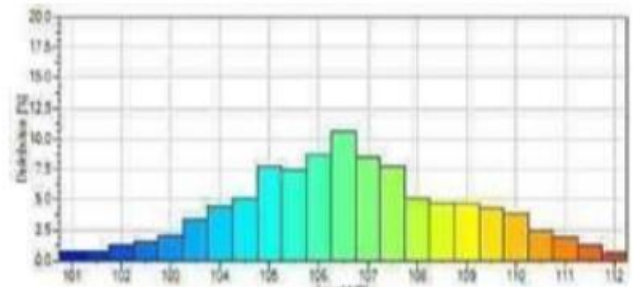


Fig 2 : Sound Distribution achieved

This method is adopted to compare the frequency rate and standard height of sound wave reaches to an human ear. The very first casestudy Kala Kendraplan was taken and imported into EASE . Focus 3 to calculate the distribution of sound levels in respective geometric seating shape . Kala Kendra sound distribution will be justified within it srectangleshape of seating .

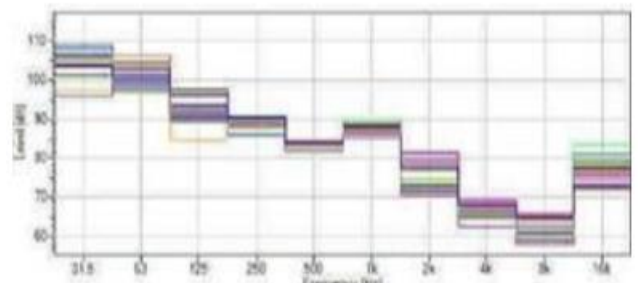


Fig 3: 19 Receivers Present

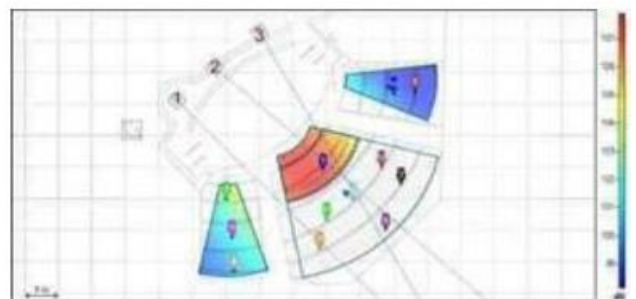


Fig 4 : Plan of Outdoor Theatre in Triveni Kala , New Delhi

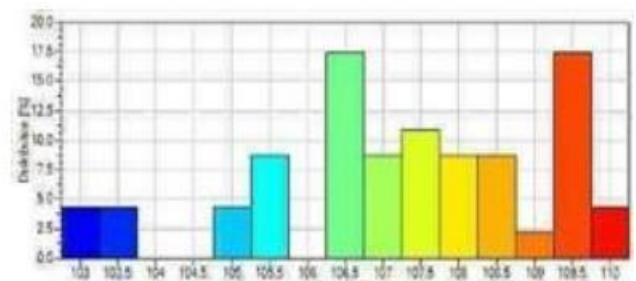


Fig 5 : Sound distribution achieved

Another fine outdoor theatre measured is Triveni Kala Sangam which has Annual Sector geometric shape which presents sound distribution where Audience zone generally intersect with each other .

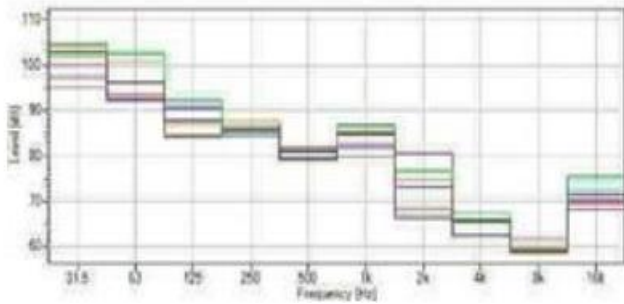


Fig 6: 10 Receivers Present

Array Width: 10.50 m
 Coverage Angle: 40°
 Spacing: 1.50 m
 Approx. Frequency Limit: 113 Hz

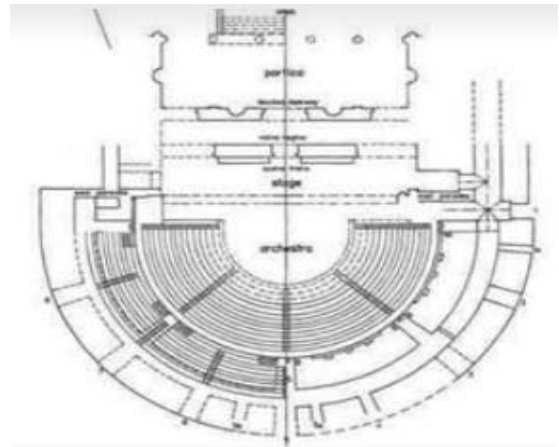


Fig 7: Jerash theatre Plan

BEST SOUND DISTRIBUTION 109~104 dB

Ear Height (Sitting)	1.20 m
Frequency Limit	113 Hz
Covered Angle	40 degree
Vertical Angle	- 1.3 degree
Bottom Angle	32.8
Above Ground	46 .80 m

It is noted that: Triveni Kala Sangam has highest range of frequency observed due to Angular seating arrangement as compared to Trapezoid layout of seating arrangement in Indian Habitat Centre & Rectangular layout of seating arrangements in JawaharKala Kendra.

Above simulation helped in achieving seating arrangement to angular shape seating arrangement with inferior acoustics.

IV. ACOUSTIC ANALYSIS

The method involved in the functionality of software is used by the absorption of sound by stone and audience. Occupied and Unoccupied condition will be investigated.

PARAMETERS

- EDT
- T (20)
- T (30)
- Curvature
- Ts , G (early)
- C (80)
- MTI (corrected)
- LF (80)
- Diffusivity (ss)
- Echo (Dietsch)
- These Parameters will be achieved in the testing generation in Odeon Software

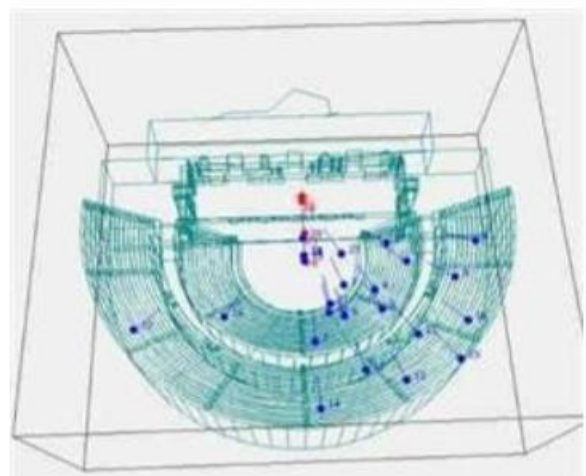


Fig 8 : 2 Source -27 Receiver

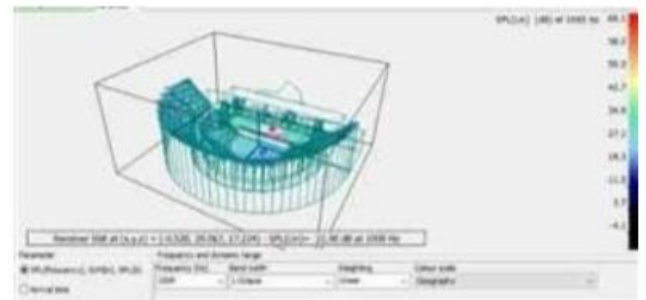


Fig 9 : FREQUENCY noted at 1000Hz varies from 19.3 dB~42.7 dB during performance

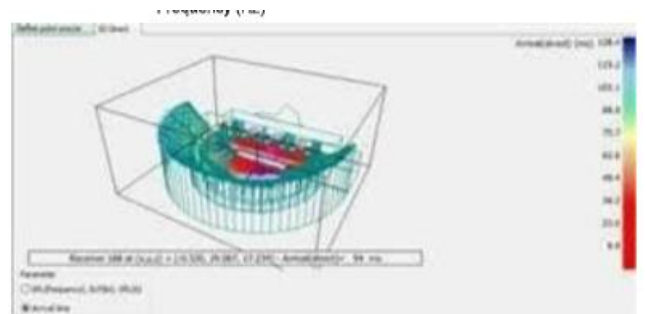


Fig 10 : At arrival time audience absorbs much sound due to their clothes sound reaches in thespacevaryingfrom 23dB~62.6 dB

➤ *Occupied vs unoccupied*

Increased SPL due to changes in design and materials

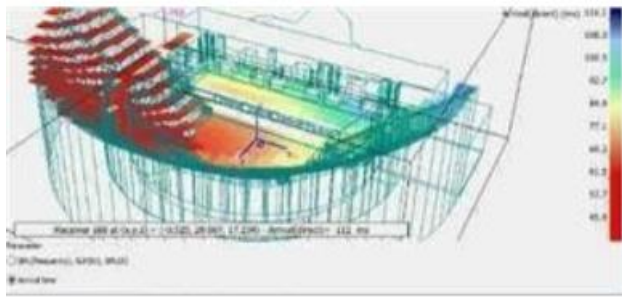


Fig 11 : Arrival time noted at Jerash theatre

It is observed during arrival time direct sound reaches to 112 ms. Sound is less travelled where there are no receivers which shows that materials used at the theatre has a strong absorption coefficient and reflects back sound on the orchestra.

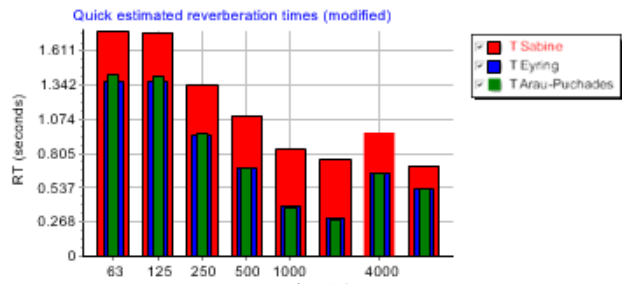


Fig 12

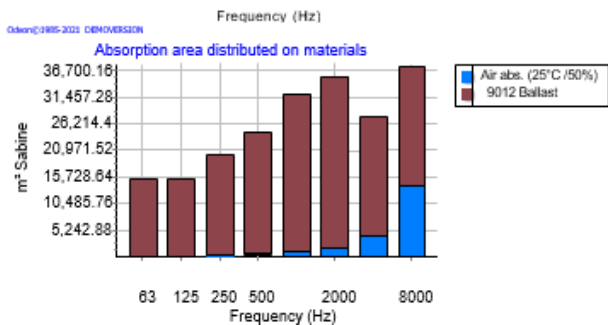


Fig 13

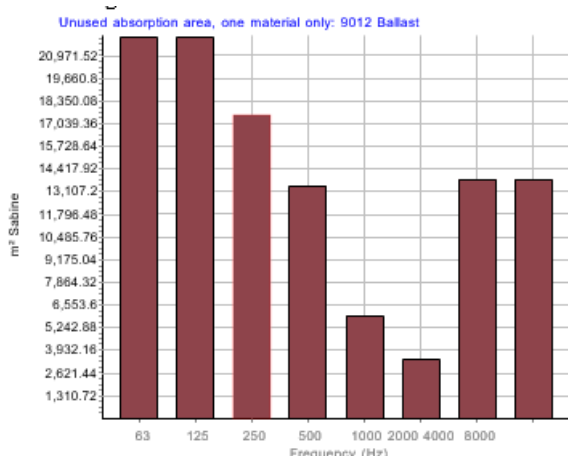


Fig 14

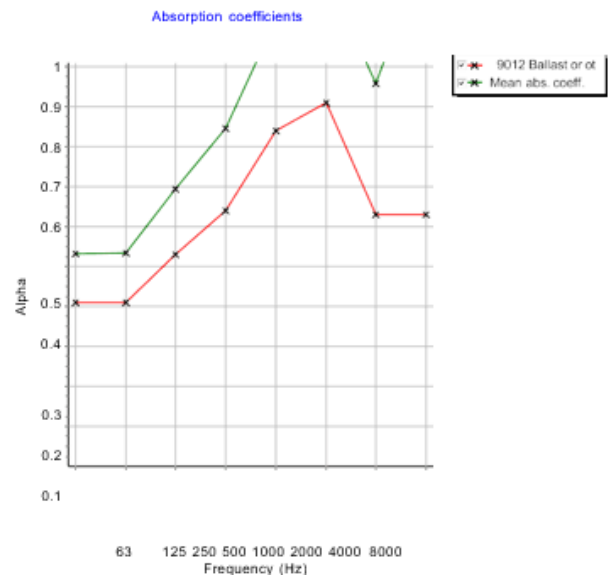


Fig 15: Absorption coefficients

PARAMETERS	STANDARD	ACHIEVED
1. T_{30}	5 - 35 Db	19-42 dB
2. EDT	0 - 10 dB	3 dB
3. D_{50} (%)	0-50 ms	0.94 ms
4. C_{80}	0-80, 1 dB	8~ 17 dB
5. T_s	10 ms	47~ 15 ms / 21
6. G (dB)	10 m	7.6 dB
7. LF (%)	5- 80 ms	< 1 ms
8. STI	0.03	0.082

Table 1: Acoustic resultants

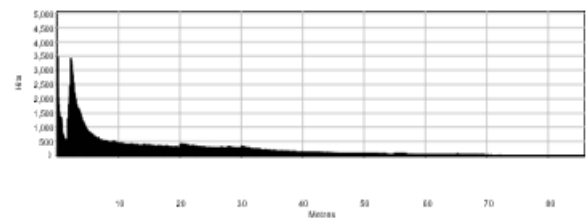


Fig 16

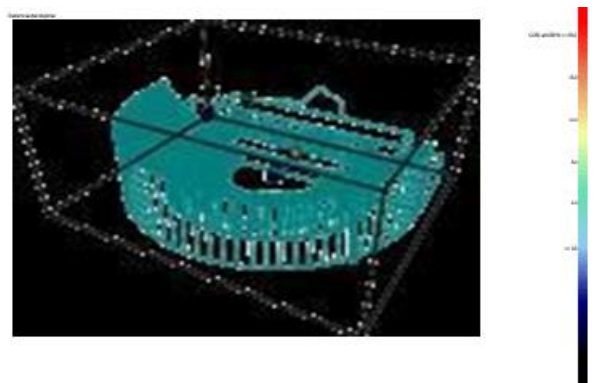


Fig 17

V. CONCLUSION

To conclude, large cities, as well as smaller towns, are improving their cultural infrastructure by maintaining magnificent new designs and structures for performing arts. The planning of the center is according to 21st century formulation of architectural design. It will be democratic with functional structural form. The Outdoor theatre will exhibit Indian influence and sensitivity. The basic principles for the design of the building are thoughtfulness to laws of Nature to be adhered in structural functionality along with cultural traditions in accordance with people's sentiments having independent view to socio-economic relations. It also blends with climatic conditions of the region. Increased sound level and reverberation can be the proof of good acoustic conditions.

REFERENCES

- [1]. Hardy, H. (1960). *Theatre of Architecture*. New York: Princeton Architectural Press, New York.
- [2]. Hardy, M. (Jun 11, 2014). *Outdoor Theatre Facilities*.
- [3]. Theatre Architecture. (2015). In L. M. Bowler, *A Phenomenology of Theatre Buildings in Performance*.
- [4]. Theatre Architecture and Urban Culture: Project 'A'. (n.d.).
- [5]. The Goals Of theatre design. (n.d.).