MIHRAB DESIGN AND ITS BASIC ACOUSTICAL CHARACTERISTICS OF TRADITIONAL VERNACULAR MOSQUES IN MALAYSIA

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Abstract
Mosque design, globally, has evolved considerably from being very simple design and functional, to more sophisticated forms and layout and recently being very monumental. Its function; however, remain the same, not only as a place for prostrations, but more so as a community centre and a symbol of Islam. Basic elements and spaces such as prayer hall, ablution, minaret, minbar and mihrab; for example, are common features in any mosque. Mihrab, a component of Qibla wall marks the Qibla direction. Functionally, it positions the Imam who recites during congregations. It form and design helps the Imam to have khusyu’ in prayer. Mihrab should also function acoustically. This research was carried out with the objectives to review the level of acoustic performance in selected mosques and to evaluate the design and acoustic performance of the mihrabs. Initial survey of 37 traditional mosques in Malaysia, built between 1728-1830, has concluded that the mosques are either square or rectangular in plan with clear Mihrab visibility from the main entrance. Mihrab's form vary from having circular niche with flat ceiling to rectangular shaped with slanting ceiling and semi-circular concaved niched forms. To evaluate the acoustical characteristics of the selected mosques the PC-based acoustic measuring system and analyser was utilized. The PC-based measuring system (dBBati32) was integrated with sound level meter (01dB Solo Metravib) as analyser. Data collected from five case study reveals initial findings that the operating facilities in the mosques resulting higher rating NC-49 which is reducing the performance of speech intelligibility. The investigations on the mosque’s mihrab offer good characteristics to confirm the tendency of fair acoustical performance with a maximum difference of 4.0dB.

Key words: Acoustic, Mihrab, Mosques.

Introduction
Study within the boundaries of mosque art and architecture has turned to be an eminent subject among scholars. Valuable information was captured and used for the enhancement and evolution of Muslim religious buildings. After the demise of Prophet Muhammad ﷺ, the administration of the Muslims and Islam in general, including the administration of mosque buildings were taken over by his four companions and then by a number of Islamic dynasties such as the Ummayad, Abbasid, Fatimids, Safavids, Ottoman and many more. Even though the leadership of Islam and the architecture of mosques changed over time, the basic components inside the zulla (main prayer hall) remained the same with a few components being added following the needs of the believers during the period of that particular mosque was built.

In his study on early Muslim architecture after the Prophet’s mosque, Kuban (1974), lists eight important components in mosques namely the Haram, Qibla wall, Courtyard, Riwaq (arcades), Mihrab, Minbar, Minaret and Maqsura. Twenty years later, Frishman (1994) who derived the list from his research on mosques throughout the Muslim world including South East Asia added Dikka (a tribune for the leaders), Kursi (Al-Quran holder), and Maida (for ablution). While agreeing to the existing components, Ashraf (2006) researched and added other elements to the mosques such as such as Qubbah (dome), Aisled (sanctuary), Iwan and Cresting or Crenellations. The study of components is crucial to determine the overall mosque designs as stated by Hasan-uddin, (1994; 247-248) who believes that mosque design in different time and regions, evolves in creating new expressions in various terms and identity.

No studies have been carried out to evaluate the performance of Mihrab acoustically except studies on acoustical characteristic of mosques in general. Ahmad (1990) presented evaluation of speech intelligibility in mosques in Amman, Jordan and concluded the acoustical characteristics of mosques had been neglected. In Saudi Arabia, 21 extensive field measurements of mosques were carried out in order to characterize their acoustical quality and to identify the impact of active environment control systems (Abdou, 2003) However, limited numbers of studies have been conducted in Malaysia. Dimon et al (2007) highlighted the compilation of contemporary issues of