



## **KNOWLEDGE DIFFUSION THROUGH ISLAMIC ARCHITECTURE: A BIBLIOMETRIC ANALYSIS**

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### **ABSTRACT**

*This paper presents an explorative bibliometrics study of Islamic architecture literature. A list of journal articles on the Islamic architecture researches published during 1962-2011 was generated for analysis from 'Avery Index to Architectural Periodicals.' architectural database. A total of 114 articles by 103 authors were identified. The term Islamic architecture was used for searching the database. Growth of the literature was studied and lotka's law was also applied to the compiled data. The finding of the study has indicated that the literature of Islamic architecture is currently receiving some interest and attention from the scholars. On the issue of pattern of authorship, single authorship dominates the literature (84.4%). Furthermore, the five-year spreading of the literature has shown that, there is a significant growth of the literature from 1977 forwards. Lotka's law was found to be in conformity with the literature of Islamic architecture. Scholars and scientists are hereby urged to improve on their collaborative researches in this subject area, this will add to their global visibility and widen the scope of their knowledge sharing.*

**Keywords:** *Knowledge diffusion, Bibliometrics, Islamic architecture, Literature growth, Lotka's law*

### **Introduction**

Generally, architecture could be regarded as the art of plotting and creating building in order to satisfy shelter and other needs of people. According to Mahmoud (2007) "Architecture refers to the science of designing and constructing buildings to meet people's physical and moral needs." Islamic architecture plays a significant role in the creation, development and perfection of the modern day architecture. The uniqueness of the Islamic architecture could be seen in its drawings, designs, constructions, creation of buildings and edifices. This may not be unconnected with the fact that, the Arabs have a very rich culture with a consistent and unique architectural practice throughout the ages of history. This trend continued with the birth of Islam as a culture and religion in the Arabian Peninsula. It engulfed the existing Arab architecture, giving it a new dimension in accordance with the Islamic dictates and rulings.

With the spread of the religion to the non- Arab communities, cultures and civilizations, many new architectural practices were also engulfed, tolerated and re-designed to suit the Islamic built environment. In line with this proclamation, Mahmoud (2007) says, "The Islamic architectural revolution

spread throughout the cities of the ancient world such as the Roman, Greek, Byzantine, Asian, North African and Central Asian cities due to Islamic conquests. New cities such as Samarkand, Bukhara, Istanbul, Qurtoba and Grenada were established. Later, they contributed to the expansion of Islamic architecture and civilization.” This unique Islamic built environment made it an interesting environment with a unique identity. Salama (2007) opined that, “If a certain environment possesses a unique character, then we may safely say it has an identity.”

Islamic built environment is unique in many dimensions. On the aspect of design for example, Mosques are designed globally to serve spiritual, moral, social and educational purposes. Jemtrud (2011) says, “The very act of designing gathers a complex network of relations that includes the technical and productive realms but moves outside those concerns to envelop the political, social, spiritual, and material as well as the everyday activities.” The similarity in character it exhibited in the building of various types of prayer houses or mosques clearly testify to this uniqueness. The mosque buildings are always focused towards a particular direction or position (Qiblah) irrespective of their type, nature and geographical location in this globe. This similarity provides an understanding that, a common goal is set to be achieved through these mosques.

Campbell and Comodromos (2009) expressed the view that, “Islamic cities of historic nature, mosques (Which are required to face towards Mecca) act as certainty operations in the fabric.” Disbursement of appropriate knowledge and information is considered vital to successful goal achievement. Lack of proper and appropriate information undoubtedly affects the way and manner in which people live and behave in their environment. Noor, Hanita and Hussaini (2011) in their study on energy efficiency in Nigerian household observed that, “Due to the absence of organization and appropriate and adequate information, households lack accurate and actionable information on how best they can achieve potential energy savings. The concern for the built environment is more in developed societies, and within them, among those individuals in higher social positions who are better informed.”

One way that is appropriate and widely accepted by scientists and scholars to get people appropriately informed, is through publishing research results in academic journals. These academic journals are globally considered as major vehicles utilized in transforming, sharing, disbursing, disseminating, broadcasting, scattering and spreading useful knowledge and information on growth and development of a given subject or discipline. In spite of the fact that, information and communication technologies (ICTs) have taken the centre stage in disseminating of scientific researches in recent times, academic journals are still very useful and accessible. In order to go with the current trends, a significant number of academic journals are now in both printed and electronic formats.

However, there is an absence of research or study relating to Islamic architecture literature growth, development and productivity of authors. Therefore, the aim of this paper is to explore the literature of Islamic architecture, taking into consideration two important aspects of bibliometrics study. They are as follows:-

- (a) Growth of the literature
- (b) Productivity of authors (applying the Lotka’s inverse square law)

## **Review of Related Literature**

### *Knowledge and Knowledge Diffusion*

The term knowledge has been subjected to many forms of definition by diverse cream of scientists and scholars. These forms of definition go with their diversified areas of expertise, training and

interest. For the purpose of this study, the definition of knowledge put forward by Drucker (1993) was found to be very relevant. The scholar says, knowledge “Proves itself action. What we now mean by knowledge is information effective in action, information focused on results. These results are seen outside the person-in society and economy, or in the advancement of knowledge itself.” Drucker’s definition considered knowledge as the end result of information when put to action or utilized. This further means that, knowledge symbolizes action which could be regarded as the product of information. Similarly Szyollowski and Krawiec (2009) explored knowledge as, “one of the interesting aspects of development of societies and civilizations, is a role of knowledge understood as accumulated facts and experiences. In this way, the knowledge can be naturally interpreted as science and technology.” This definition is quite similar with the first definition because both the two laid emphasis on the practicability of knowledge through experiences and presentation of facts.

Many other definitions and views about knowledge by scholars and scientists were expressed in order to give a clear meaning that could be understood and used. Significant number of these definitions tried to differentiate between knowledge and information. To them knowledge translate and give meaning to information. Kim and Ju (2008) expressed similar view that, “Like information, knowledge is about meaning that is context-specific and relational.”

Knowledge diffusion, distribution or sharing refers to a situation whereby knowledge is processed in a mode that can be understood and used by other persons. To share knowledge, is to aid an organization, an institution, group of individuals or individuals to grow. For it is assumed that, knowledge shared or disbursed satisfies the need of users and thus going to be put into practice. Kim and Ju (2008) found in their study on faculty perception on knowledge-sharing in an academic institution that, “By nature, faculty jobs deals with creating, disseminating, and utilizing knowledge for research and teaching purposes. It is not surprising that faculty are fully aware of the importance of knowledge-sharing and its related benefits for themselves. In contrast to public sectors or business settings, they appreciate the value of knowledge-sharing for mutual benefit.”

Interaction enhances knowledge-sharing among both groups and individuals. Gao, Guan and Rousseau (2011) opined that, “Learning is an important process by which tacit and explicit knowledge can be transferred through strong interactions between different groups of individuals.” Similarly, Teixeira (2011) observed that, “The formal and informal networks associated to an invisible college often arise and increase in density when there is a need for researchers to share human, financial and technical resources, that is, share the same information use environment-a school or a working place (in other words, the same professional affiliation).” Some scholars nowadays compared knowledge disbursement or diffusion with the spread of disease in a given community. Accessibility to the knowledge may be quite flexible.

Gao and Guan (2012) observed that, “Knowledge diffusion is also an important social process in which new ideas are transmitted from person to person. The diffusion of ideas holds many qualitative similarities to the spread of a disease through a population.” Furthermore, knowledge sharing is quite important and effective when it is put into practical utility. This will bring significant changes and progress in an organization. Along this line, Ming-ming, Tie-nan and Xuan (2010) expressed similar view that, “Only comprehensive sharing and using knowledge distributed in the organization to solve practical problems effectively can fully reflect the value of knowledge.”

### *Bibliometrics*

Popularly, the term bibliometrics is defined as a method of scientific research that utilizes statistical as well as mathematical analysis to documents and related sources. Laurens, Zitt and Bassecoulard (2010) opined that, “Bibliometrics can be considered as the study of networks associated with scientific or technological activity: networks of scientists/ institutions, of articles, of terms, of journals.” From the above mentioned statement, one can understand that bibliometrics methods of research are now highly recognised by the present day scholars and scientists. In spite of the fact that, the world is moving from information age towards knowledge based economy, the impact of bibliometrics as a research method cannot be ignored or neglected. Claro and Costa (2011) expressed similar view that, “Bibliometric studies of research performance currently use a diverse set of indicators, focusing on attributes of journals, publications and citations. In terms of complexity, quantity and quality of data and processing required, indicators range from simple counts to sophisticated normalized scores, controlling for document types, publication years and scientific fields.”

Nevertheless, bibliometrics as a research method could be considered among the reliable and cherished methods of research in this century. Many scholars and scientists considered bibliometrics method to be highly reliable because of its accuracy of research results. Yi and Jie (2011) conveyed that, “Bibliometric studies carried out in recent years have provided an accurate and presumably objective method of measuring the contribution of a paper to the advancement of knowledge.” Similarly, Natale, Fiore and Hofherr (2012) presented that, “Bibliometric methods, proved useful for mapping a research area, identifying the relevance of themes in the scientific literature and understanding how research fronts evolve and interact.”

Also, some scholars are now suggesting that the method should be used in place of the existing methods utilized by governments and agencies on national researches. Abramo, Andrea D’Angelo and DiCosta (2011) pronounced similar view that, “Development of bibliometric techniques has reached such a level as to suggest their integration or total substitution for classic peer review in the national research assessment exercises, as far as the hard sciences are concerned.” The extent to which a subject or literature grow; serve as a pointer to the extent of growth, spread and diffusion of such a subject or literature. Behrens and Lucksch (2011) offered that, “Growth rates of published literature are indicators of the development of science.” By the above mentioned statement, growth of the Islamic architecture literature would be considered as indicator of the development of the literature.

### **Methodology**

The articles used in the study were identified from *Avery Index to Architectural periodicals* using “Islamic architecture” as the term for searching the index. This database was selected solely for the study mainly, because, it is considered as one of the comprehensive databases in the field of Architecture. A list was compiled for the articles removed from the database for analysis. In order to have comprehensive information on the growth of the subject literature, the articles were grouped into five-year period from 1962 through 2011. Ten groups emerged and each of the group was analysed manually, and separately. The final analysis was done using the Microsoft Excel 2010.

Furthermore, Lotka’s inverse law of scientific productivity was utilized for the literature of Islamic architecture to determine the extent of productivity of authors. The law can be expressed as: -  $X_n Y = C$  where:-

**X** = Number of authors

**Y** = Number of authors with **X** articles

**n** = Is an exponent with a fixed value of **2**

**C** = Is a constant depending on the subject or discipline

## Findings and Discussion

### *Growth of the Literature*

On the growth of Islamic architecture literature, Table 1 shows the distribution of journal articles produced during the period of the study, at a five-year interval. The data shows that, 85.07% (97) of the Islamic architecture articles were published during the period 1977-2011. In figure 1, growth of the Islamic architecture can be seen clearly. From the initial stage, the growth was slow but over time it began to progress and picked up. The growth of the literature from the period 1977 was exponential. This shows clearly that, Islamic architecture has received a significant attention from the scholars particularly during this period of the study. It is quite important to know that research in Islamic architecture nowadays is very attractive among the scholars, authors and scientists. This condition contributes significantly towards growth of the literature, expanding readership, creating interest among networks of authors, researchers, architects and potential architects.

**Table 1: Five-yearly Distribution of Periodical Articles of Islamic Architecture**

Year	Number of articles	Cumulative number of articles	Percentage of articles	Cumulative percentage
1962-1966	01	01	0.88	0.88
1967-1971	03	04	2.63	3.51
1972-1976	13	17	11.40	14.91
1977-1981	08	25	7.01	21.92
1982-1986	20	45	17.54	39.46
1987-1991	17	62	14.91	54.37
1992-1996	21	83	18.42	72.79
1997-2001	14	97	12.28	85.07
2002-2006	15	112	13.16	98.23
2007-2011	02	114	1.75	99.98

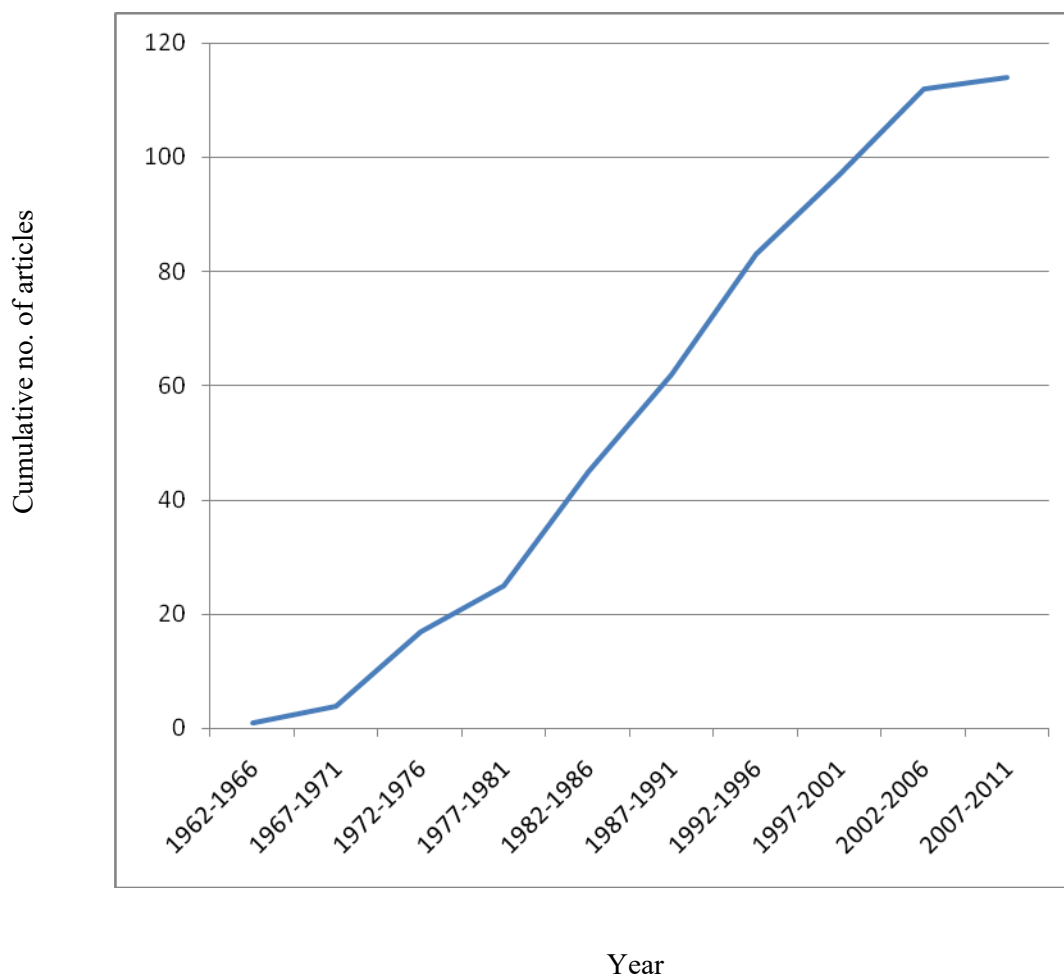


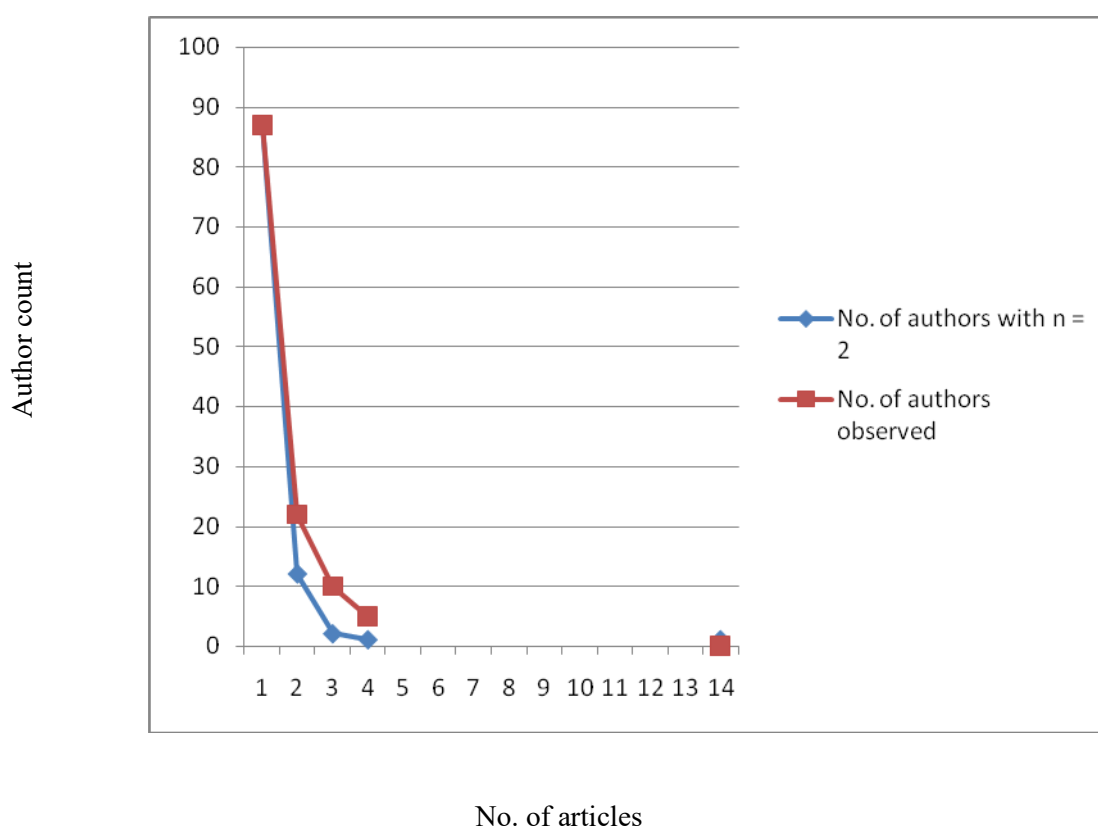
Figure 1: Growth of Islamic architecture literature

### *Productivity of Authors*

The number of authors contributing both singly and multiply articles were counted manually. From the authors' data, one could see that 103 authors produced 114 articles with an average of 1.0% author per article. Table 2 shows author productivity data for lotka's law of productivity. Out of the 103 name of authors, 87 (84.4%) produced one article, 12 (11.65%) produced two articles. The calculation for the Lotka's law was,  $n = 2$ ,  $C = 87$  and the values obtained as a result of the application of the law could be seen in the fourth column of the table.

**Table 2: Author Productivity for Lotka's Law**

Number of articles(x)	Number of authors observed (y)	Percentage of authors	Number of authors with n = 2
1	87	84.4	87
2	12	11.65	22
3	2	1.94	10
4	1	1	5
14	1	1	0



**Figure 2: Observed versus number of authors with  $n = 2$**

The data in figure 2 shows the observed versus the estimated number of authors with  $n = 2$  for the number of journal articles from 1 to 14. The observed and estimated lines can only be distinguished in the middle of both the two lines. Despite this finding, one could say that, Lotka's formulation of inverse square law of scientific productivity is applicable to the growing literature of Islamic architecture. Authors are said to be productive based on the number of journal articles they produced on a particular subject or discipline. This is achieved by applying some bibliometrics laws. Among these laws, Lotka's law of productivity is considered among the popular and most used bibliometrics laws. Therefore, the result of its application on Islamic architecture has suggested some significant aspects of productivity.



### Conclusion and Recommendations

The literature of Islamic architecture has shown a significant growth during the period of the study. This clearly indicates that, the subject is receiving attention from the scholars, scientists and authors in the area. The major conclusion to be driven from this study is that, authors that contribute to the growth of the literature were found to be exclusively single authors (84.4%). This finding corroborates that of Thanuskodi (2011) on his research on Library herald journal, where single authorship outnumbered the rest with (52.17%). Considering the period or scope of the study 1962-2011, (49) years, one may draw another conclusion that, the literature of Islamic architecture confirmed the popular saying as Weintraub (1980) opined that, whereas scientists collaborate, humanist rarely collaborate. This further gives us important information that, the literature tilts more to arts and humanity discipline rather than the sciences discipline. Therefore, the issue of collaborative researches in the area was highly de-emphasised and not practiced seriously.

Many bibliometrics researches in this subject area exhibiting other aspects of pattern of authorships are hereby recommended. At this juncture scholars and scientists in this discipline are seriously challenged with the issues surrounding collaborative researches and co-authorship efforts. This will pave way for tacit knowledge, new findings and new knowledge to be shared and diffused globally. Growth of any form of literature with high speed and wide spread is tied down to the extent to which scholars and scientists in the discipline engaged in collaborative studies and researches. Therefore scientists become influential, recognised easily and quickly, when they practice co-authorship and collaborative researches.

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