

CHALLENGES IN THE PRACTICE OF TRADITIONAL KOLAM AMONG INDIAN WOMEN IN THE KLANG VALLEY, MALAYSIA.

Ilangeswary Murugan¹, Velu Perumal^{1*} and Khairul Manami Kamarudin¹

¹Department of Industrial Design, Faculty of Design and Architecture,
University Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.

*Corresponding author:
velu@upm.edu.my

ABSTRACT

Kolam or floor drawing is an important element of the Indian cultural heritage and an integral part of the Indian traditions. This floor art is mainly performed by women from the Indian diaspora in Malaysia. The aim of this study is to highlight the challenges the Indian women encounter in practicing the traditional Kolam in the Klang Valley, Malaysia. A purposive sampling technique was used to collect data online. The questionnaire prepared was validated by Kolam experts. An online questionnaire was used because of the current COVID-19 pandemic where face-to-face survey is not feasible. The online questionnaire received 203 responses. This study employed the quantitative methodology using the SPSS software and tested with the Cronbach's alpha tool. The result show that Malaysian Indian women faced challenges of difficult to draw, time constraints, lack of interest, materials preparation and limited space in drawing Kolam during festivals. These challenges have an impact and have posed a serious threat for the survival and maintenance of the form of traditional Kolam. Preserving traditional Kolam will give future generations the opportunity to enhance further their knowledge of traditional Kolam drawing.

Keywords: Cultural Practices, Cultural Heritage, Indian Folk Art, Kolam

1. INTRODUCTION

Culture refers to the lifestyle of people and it is essential for every activity in our lives (Perumal, 2017; Satpathy, 2015). Cultural practices include values, beliefs, arts, habits, traditions and heritage (Perumal et al., 2019; Chalwa & Mohapatra, 2017). Tradition is a practice or behavior which is passed down within a group or society from one generation to the next (Satpathy, 2015; Hamzah et al., 2015). Heritage is the blending of culture, tradition, ethnicity, history and memories that are inherited by the future generations (Omonov & Karimov, 2020; Mallik et al., 2013). UNESCO defines culture that is passed on from our ancestors as cultural heritage (UNESCO, 2018). It encompasses both tangible and intangible elements (Brancoveanu, 2018; Hussin, 2018). Tangible elements are physical forms that include handicrafts, folk arts, architecture and artifacts (Silverman & Ruggles, 2008). Intangible elements are non-physical forms such as rituals, social practices, festivals, oral traditions and performing arts (Bonn et al., 2016).

In the Indian community, *Kolam* is an important tangible cultural heritage (Jagadisan, 2018; Letchumanan, 2013). However, in the 21st century, the Indian diaspora worldwide are facing challenges in trying to ensure the continuity of their cultural practices, traditions and rituals (Qin et al., 2019; Satpathy, 2015; Mallik et al., 2013). In fact, *Kolam* is facing a possible extinction due to its very diminished practice in the daily life of the Indian community (Ghosh, 2011; Johnson, 2005). More alarmingly, the traditional Kolam practices are being slowly wiped out with the use of unauthentic

Kolam techniques that utilize instant ready-made materials such as stickers and paints (Chacko, 2016; Roy, 2013). Meanwhile, Balamani.M, (2015) also maintains that the rapid on-going urbanisation together with the on-going social changes in the cities, rapid economic growth, distorted peoples' attitudes and cultural practices and have adversely affected the practice of the traditional *Kolam*. Hence, this research is therefore vital towards the preservation of the traditional and conventional *Kolam* so that future Indian generations of Malaysia can understand, practice and learn this traditional form of art.

2. LITERATURE REVIEW

Kolam is a type of floor drawing known as traditional floor art, mainly practiced by women in the Indian community worldwide (Jagadisan, 2018; Rahbarnia & Chadha, 2015; Chauhan et al., 2014). The word *Kolam* implies beauty in the Tamil language (Jagadisan, 2018; Chacko, 2016; Letchumanan, 2013). According to Tiwary (2017), Chattopadhyaya (2016) and Nagta & Thamburaj (2006), *Kolam* drawing is a traditional practice that has evolved from the cave era. Practices of *Kolam* is very common among Hindus in Malaysia, India, Pakistan, Nepal, Sri Lanka and Singapore (Jagadisan, 2018; Tiwary, 2017; Rahbarnia & Chadha, 2015). *Kolam* is usually drawn using rice flour. In the Tamil language, rice flour is called *Arisi Mavu* and hence the name *Arisi Maavu Kolam* (Chacko, 2016; Roy, 2013). In addition, the *Kolam* is made of rice flour which is ideally meant to become food for the ants and birds at the end of the day that the *Kolam* is drawn (Sachdev, 2019; Laine, 2009). The Indian community strongly believe and follow this concept of Karma (a system where beneficial effects are derived from past beneficial actions and non-beneficial effects from past non-beneficial actions) in their daily lives and hence the ability to feed the surrounding creatures on a daily basis will enable better Karma and ensure a happy life (Lakshmipathy, 2016). Domestically, *Kolam* is drawn by the women in early mornings everyday in front of their homes as a symbol of cheerfulness, compassion, good fortune, wealth and success (Gosai, 2018; Lakshmipathy, 2016). *Kolam* is also used as a medium of visual communication to express or inform friends and publics about emotional stages in life and celebrations of occupants of house (Tadvalkar, 2013). It is also often drawn during cultural or religious festivals such as Deepavali, Pongal, Kartigai as well as social ceremonies such as marriages, child naming ceremony and engagements (Krithivasan, 2016; Waring, 2012). Figure 1 shows Rice Flour *Kolam*.

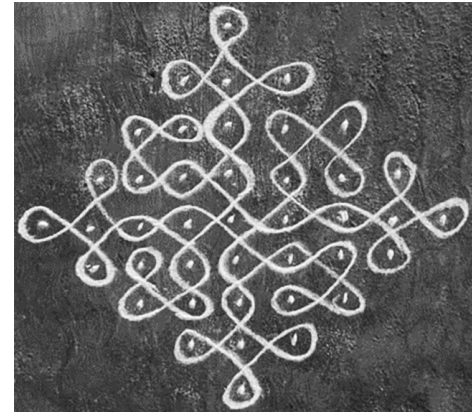


Figure 1: shows Rice Flour *Kolam* (Source: Instagram post)

There are few steps (See Figure 2) in preparing the material for the rice flour *Kolam*. According to Krithivasan (2016) and Laine (2009), the first step involves soaking of rice in water for several hours and then washed. The cleaned rice is then grinded until it becomes fine powder. Finally, the grinded rice flour is then spread-out on a flat surface and dried for 3 to 4 hours under the hot sun (Chacko, 2016). According to Sachdev (2019) and Seetharaman & Neela (2013), the fine dried rice flour can also be used for cooking purpose.

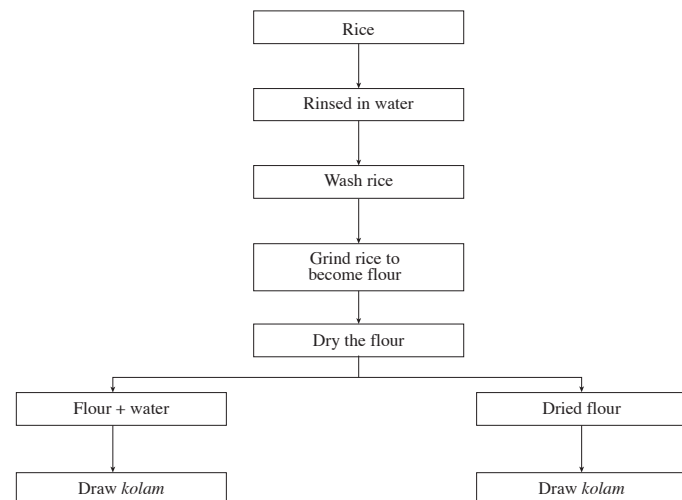


Figure 2: Steps in the preparation of Rice Flour *Kolam* drawing

Before commencing the *Kolam* drawing the floor must be clean. Traditionally, the floor used to be cleaned with water mixed with fresh cow dung (Gopalan & Vanleeuwen, 2015). According to Brunda (2015), Raj et al., (2014) and Ascher (2002), water mixed with cow dung washes and purifies the home environment and acts as an antiseptic agent. Once the floor is dried, the motif and size of the *Kolam* is determined. In drawing the *Kolam*, the rice flour is held in the hand and released between the thumb and the index finger. Normally, *Kolam* drawing begins with dots that are arranged in rows and columns (Thakur, 2014; Nagta & Thamburaj, 2006). The dots are then joined to form straight or curved lines that merge to become motifs (Naranan et al., 2019; Knigh, 2018). According to Ram (2010), the dots represent the difficulties we face and the lines connecting the dots reflect the journey in our lives.

Kolam is not only decorative but also has semiotic and semantic significances (Tapaswi, 2019; Brunda, 2015). Researches have shown that *Kolam* drawing relieves stress, improves creative thinking, solve problematic issues and signifies positive energy (Lakshmipathy, 2016; Akila & Nandagopal, 2015). *Kolam* drawing practice is also recognized as a form of physical activity that helps to sustain good health for women (Krithivasan, 2016; Thakur, 2014). When women bend their bodies in order to draw the *Kolam*, their back bones are twisted in a posture known as Yogasana (Jagadisan, 2018; Smit, 2013). The Yogasana posture is believed to strengthen the backbone, thus giving the waist and hip a good exercise (Arora et al., 2019; Gosai, 2018). Besides personal physical health benefit, *Kolam* is also environmental-friendly, as the rice flour of *Kolam* eventually becomes food for ants and birds (Sachdev, 2019; Gosai, 2018; Krithivasan, 2016). *Kolam* drawing practice enables one to reinforce creativity and logical thinking (Jagadisan, 2018; Lakshmipathy, 2016).

According to Thirumurthy and Simic-Muller (2012) and Ascher (2002), creating *Kolam* patterns or performing *Kolam* drawings involve ethnomathematical activities that involve mathematical principles and cultural values (Gilsdorf, 2015; Horsthemke, 2006). The *Kolam* motif is said to encompass mathematical principles such as the theory of number, sequencing, abstract algebra, fractions and computer science (Singh et al., 2013; Bapat, 2009; Yanagisawa & Nagata, 2007). A Japanese researcher, Shojiro Nagata, used *Kolam* motif for educational exercises (Nagata, 2015). *Kolam* motif is also used as the design concepts in developing cognitive related toys and puzzle games (Nagata, 2015), tile design, graphical languages and wallpaper design (Sachdev, 2019; Nagata, 2015; Negi et al., 2015).

Globalization and rapid technological developments have resulted in major transformations in lifestyle and living standards of people (Raikhan et al., 2014; Rahman, 2014; Hassi & Storti, 2012). Likewise, Indian culture has also been subjected to these global influences (Chalwa & Mohapatra, 2017; Ranade, 2016). In recent times, the practice of *Kolam* drawing has been declining gradually. It is believed that the decline in *Kolam* practices could result in a negative impact on the cultural practices and cultural heritage of the Indian community. This study presents the challenges in the practice of traditional *Kolam* among Malaysian Indian woman, especially in the Klang Valley, Malaysia. Figure 3 shows an example of the sticker *Kolam*.



Figure 3: Sticker Kolam (Source: Pinterest image)

3. METHOD

In this study a quantitative methodology was used based on purposive sampling. Purposive sampling is a non-opportunity sampling technique (Taherdoost, 2016) that allows recruitment of participants who have knowledge and experience on the related subject (Creswell & Clark, 2011; Kumar, 2005).

The study's population comprised of women with more than five years of experience in drawing the *Kolam*. Data were collected in Klang Valley which includes 5 regions namely Klang Federal Territory of Kuala Lumpur, Petaling, Gombak and Hulu Langat. A questionnaire was developed to assess the challenges faced by Malaysian Indian women in drawing *Kolam* during festivals. In the questionnaire, the challenges to be assessed were in terms of five aspects i.e. 1) difficult to draw 2) time constraints 3) lack of interest 4) materials preparation 5) limited space.

The questionnaire prepared was validated by expert of its content before being distributed to targeted respondents. It is to ensure that the questionnaire are suitable and reliable to be used for this study. The experts chosen are based on their expertise in the areas of study. Once the questionnaires were authenticated, the soft copy form is then distributed online to the targeted respondents due to the current COVID-19 health pandemic that rendered face - to - face survey not feasible. After the questionnaires were sent outline data were collected over a period of three weeks.

4. RESULTS

After gathering data, the questionnaire's reliability was investigated using SPSS software. The questionnaire's reliability was tested with the Cronbach's alpha. The Cronbach's alpha values for all the variables were found to be above 0.80, which are considered good and excellent. Therefore, this reveals that the questionnaire used was reliable and could be used for the analysis of study.

Category	Background respondents	Frequency	Percentage
Age Group	18-27	30	14.8
	28-37	67	33.0
	38-47	52	25.6
	48-57	41	20.2
	58 and above	13	6.4
Education Level	No formal education	28	13.8
	High school	36	17.7
	Diploma	71	35.0
	Degree	57	28.0
	Master	8	4.0
	PhD	3	1.5

Category	Background respondents	Frequency	Percentage
State the experience of drawing a <i>Kolam</i>	1-5 years	56	27.6
	6-10 years	67	33.0
	11-15 years	42	20.7
	16-20 years	25	12.3
	21 and above years	13	6.4
Occupational sector	Student	29	14.3
	Government sector	24	11.8
	Private sector	76	37.4
	Self-employed	26	12.8
	Retiree	12	6.0
Residence	Housewife	36	17.7
	Urban	56	27.6
	Suburban	147	72.4

Table1:Background of the respondents

The background of the respondents is shown in Table 1. Out of a total of 203 women who responded in this survey, 30 respondents (14.8%) were in the 18 to 27 age group. However, the highest number i.e. 67 respondents (33.0%) were in the 28 to 37 age group. For the 38 to 47 age group there were 52 respondents (25.6%). This constitutes the second-highest group in the survey. There were 41 respondents (20.2%) belonging to the third-highest group i.e. the 48 to 57 age group. There were only 13 (6.4%) women respondents, the lowest in the 58 and above age group.

In term of education level, there were 28 (13.8%) women respondents who had no formal education. 36 (17.7%) women respondent's education levels were high school holders. The majority, 71 (35%) women respondents who were diploma holders. The second highest group, 57 (28.0%) women respondents were degree holders. There were only 8 women respondents who had a Master degree (4.0%) and 3 women who were PhD holders (1.5%). Most of the respondents have had more than 5 years of experience in drawing the *Kolam*. Therefore, this shows all the respondents had some knowledge and experience in drawing the *Kolam*.

In terms of jobs, 76 women respondents (37.4%) were working in the private sector. This was followed by 36 (17.7%) women respondents who are housewives. But the third highest number of

respondents i.e. 29 (14.3%) were students. This show that the art of *Kolam* drawing could be taught in schools and institutions of learnings and could possibly be turned into a competitive program in the school curriculum. In terms of residence, the highest number of respondents i.e. 147 (72.4%) resided in the suburbs of towns and cities. The remaining 56 of them (27.6%) resided in the urban areas. There were no respondents from the rural areas as Internet connectivity was a stumbling block in getting their feedback online.

Main challenge	Sub challenges	Frequency	Percentage
Difficult to draw (n=57, 28.1%)	Limited skill	25	43.9%
	Not convenient	19	33.3%
	No indigenous knowledge	13	22.8%
Time constraints (n=52, 25.6%)	Numerous commitments	24	46.2%
	Lifestyle	18	34.6%
	Urbanization	10	19.2%
Lack of interest (n=46, 22.7%)	Western influences	20	43.6%
	Socio-culture	14	30.4%
	Less recognition	12	26.0%
Materials preparation (n=36, 17.7%)	Traditional method of preparation of materials	12	33.0%
	Adoption of new technology	11	31.0%
	Ready-made materials	13	36.0%
Limited space (n=12, 5.9%)	Living in high-rise buildings	5	41.7%
	Entrance space limited	4	33.3%
	Environment	3	25.0%

Table 2: Challenges face in drawing *Kolam* for festivals

From the results, it can be summarized that the Indian women encountered five challenges in practicing the traditional *Kolam* in the Klang Valley, Malaysia. The main challenges in drawing *Kolam* during festivals was difficult to draw (n=52, 28.1%). Out of this, a majority 57 (43.9%) stated lack of skills, 33.3% lack of convenience and 22.8% stated lack of indigenous knowledge for not drawing *Kolam* during festivals. The second most significant challenge was time constraint (n=52, 25.6%). Out of this, majority 46.2% cited the numerous commitments they had made it difficult for them to draw *Kolam* during festivals. The other two factors were lifestyle at 34.6% of the respondents and urbanization at 19.2% of the respondents. Lack of interest among the women

(n=46, 22.7%) was another reasons for not drawing *Kolam* during festivals. Out of the 46, 43.6% admitted that western culture influenced their attitude, 30.4% declared that it was due to socio-cultural mix and 26.0% argued that there was a lack of recognition for drawing the *Kolam*. Out of the 203 respondents, (n=36, 17.7%) had problems with materials preparation. Out of the 36, 33.0% did not know the traditional method of preparing the materials, 31.0% opted for the adoption of new technology and 36.0% asserted on the availability of ready-made materials. Among the five challenges, availability of space was the least issue. Only (n=12, 5.9%) out of the 203 respondents agreed that the space issue was a challenge for not drawing the *Kolam* during festivals. Of this, 41.7% stated that they were living in high-rise buildings, 33.3% stated entrance space limitation and 25.0% stated environmental factors as the sub challenges.

5. DISCUSSION

Based on detailed analysis of the 203 respondents' answers, it could be summarized that there were five challenges that were being faced namely 1) the difficulty to draw 2) time constraints 3) lack of interest 4) material used in preparation and 5) limited space. The findings in this study shows continuous difficulty in practicing the art of drawing the *Kolam*. In addition, (SenGupta & Deb, 2015; Ascher, 2002), are also of the opinion that there are many problems in drawing the traditional *Kolam* with intricate patterns as the skills are limited. This has been supported by Chacko (2016) who cautions that *Kolam* is losing out because the current generation has limited skills, such as free-hand movement, and are not able to control body postures for a longer time when drawing the *Kolam*. Moreover, indigenous knowledge is lacking, and little effort has been made to extend this traditional practice (Chauhan et al., 2014).

Time is another factor that constraints women from drawing the *Kolam* during festival times. According to Jagadisan (2018) and Jones (2003), economic issues have forced women to work to help increase their household income to meet increased expenses. Most of the time they have to bring their workload home and as such they do not have enough time to practice traditional *Kolam* in their daily lives. As stated by Balamani. M (2015) urbanization brings about social changes in the city, rapid economic development, changes in the behavior of people and cultural practices. People who migrate to urban areas in search of lucrative jobs and high income, leave this art in the villages, hence the decline in the importance of *Kolam* practices (Rahbarnia & Chadha, 2015; Laine, 2009).

As Western cultural influences on Malaysian Indian society have increased and also because of cultural homogenization there is now a lack of appreciation for cultural values and this has led to a decline in the practice of *Kolam* drawing (Jagadisan, 2018; Laine, 2009). As a result of the socio-cultural changes, the *Kolam* has changed in its function, motif and has been interpreted differently. Hence, the traditional *Kolam* has changed into a modern form. For instance, there is the addition of English words like “welcome” in the *Kolam* design. The younger generation shows less appreciation for the traditional *Kolam* and tends to draw pictures on the ground with coloured powder, stickers etc. instead of the rice flour. These do not conform to be the traditional *Kolam* concepts (Tapaswi, 2019).

There are challenges related to the materials preparation for *Kolam* as well. As stated by Chacko, (2016) and Roy, (2013) in the era of busy life, the traditional method of preparing materials for *Kolam* cannot be learned by the Indian women in a skilled manner because of their busy schedule. This has gradually replace the practices of the traditional *Kolam* by the adoption of new methods such as artificial *Kolam* that uses readymade materials. As stated by Letchumanan (2013), “the traditional method of drawing *Kolam* is now experiencing obstacles in modern times due to technological advances in art, such as stickers, polystyrene and paints, erasing its originality and uniqueness.”

Back in the olden days, for people living in the rural villages, space was never a challenge. Nowadays, as people are living in high-rise buildings like condominiums and apartments, there is hardly any space to draw the *Kolam* (Chauhan et al., 2014). The urban environment has become unsuitable for women to indulge in this traditional form of art. Traditionally, women drew the *Kolam* on the ground, but this practice is no longer possible in cities because the house entrance is now laid with cement or tiles (Sachdev, 2019; Rahbarnia & Chadha, 2015). Although it may be easier to draw the *Kolam* on cement and tile surfaces, the original significance of the traditional *Kolam* is lost and no more authentic.

Hence, based on this study, Indian women face the challenges of difficult to draw, time constraints, lack of interest, materials preparation and limited space in drawing the traditional *Kolam* during festivals. In the long run, these challenges have negative impacts and pose serious threats for the survival and maintenance of the forms of the traditional *Kolam*. It should be stressed that preserving the traditional *Kolam* culture will give future generations the opportunity to enhance further their knowledge in traditional *Kolam* drawing.

6. CONCLUSION

This research has revealed five challenges faced by Malaysian Indian women in the Klang Valley, Malaysia in drawing the traditional *Kolam*. Although the sample of this study was rather small (203 respondents) the results obtained provide meaningful insights into the diverse challenges faced by the women in the Malaysian Indian community in preserving the art of drawing the traditional *Kolam*. With the ever-increasing influences of globalization and urbanization, this form of traditional practice may slowly be lost if attempts are not made to preserve it. As such, this study advocates that these challenges must be dealt with seriously and every effort must be made to keep this art form alive and preserved as a unique and valuable cultural heritage for the younger Indian generation in particular and Malaysians in general.

REFERENCES

- Akila, L., & Nandagopal, C. (2015). An Introduction to Art Therapy and Creativity in Organisations. *Proceedings of the International Symposium on Emerging Trends in Social Science Research*, 1-9. Retrieved from <http://docplayer.net/826069-An-introduction-to-art-therapy-and-creativity-in-organisations.html>
- Arora, M., Gogawale, S., & Patwardhan, R. P. (2019). Efficacy Of Yogasana In The Management Of Grudhrasi (Sciatica). *World Journal of Pharmaceutical Research*, 8(2), 1414-1421. doi:10.20959/wjpr20192-14229
- Ascher, M. (2002). The Kolam Tradition: A tradition of figure-drawing in southern India expresses mathematical ideas and has attracted the attention of computer science. *Health & General Sciences Collection, JSTOR Archival Journal & Primary Source Collection, Life Sciences Collection*, 9(2), 56-63. Retrieved from <https://www.jstor.org/stable/27857597>
- Balamani, M. (2015). *Women rituals and cultural practices (Doctoral dissertation)*. Maharaja Sayajirao University of Baroda. Retrieved from <http://hdl.handle.net/10603/38222>
- Bapat, M. (2009). Using Ethnic Art to Emphasize Laws of Reflection. *The Physics Teacher*, 47(8), 542-543. doi:10.1119/1.3246476

- Bonn, M., Kendall, L., & McDonough, J. (2016). Preserving Intangible Heritage: Defining a Research. *Proceedings of the Association for Information Science and Technology*, 1-5. doi:<https://doi.org/10.1002/pr2.2016.14505301009>
- Brancoveanu, R. (2018). Romulus BRÂNCOVEANU * When Does “Tangible” Meet “Intangible” ? Some Reflections about the Relation between the Tangible and Intangible Cultural Heritage. *Journal of Hermeneutics, Art Theory & Criticism*(21), 7-18. Retrieved from <https://www.proquest.com/openview/30339140adc830ec2b1b748962c58ac0/1?pq-origsite=gscholar&cbl=1106344>
- Brunda, A. (2015, January 27). *Suzhi Kolangal/South Indian Traditional Art*. Retrieved from <https://www.imaginary.org/gallery/suzhi-kolangalsouth-indian-traditional-art>
- Chacko, B. K. (2016, August). *Interplay of Illustration, Narration And Metaphor In Kolam Art With References To South Indian Traditions*. (Doctoral dissertation). CHRIST University, Bangalore, Karnataka, India. Retrieved from <http://hdl.handle.net/10603/118911>
- Chalwa, H., & Mohapatra, H. (2017, February). Globalization and its Impact on Indian Culture and Technology. *Scholarly International Multidisciplinary Print Journal*, 4(1), 1-15. Retrieved from https://www.researchgate.net/publication/313717631_Indian_Culture_and_Globalization
- Chattopadhyaya, I. (2016). “Living Tradition: A Study of Prehistoric Rock-paintings and Indigenous Art from District Sonbhadra, Southern Uttar Pradesh, India”. *Athens Journal of Humanities & Arts Conference Paper*, 1-21. Retrieved from <https://www.semanticscholar.org/paper/Living-Tradition%3A-A-Study-of-Prehistoric-and-Art-Chattopadhyaya/54d7dd289c2573f8667d2aa51434344f5f37f952>
- Chauhan, A., Singh, K., & Kumar, A. (2014, August). Parameterization of Indian Traditional Rangoli Design Patterns. *International Journal of Computer Applications*, 99(5), 1-5. doi:10.5120/17369-7895
- Creswell, J. W., & Clark, V. P. (2011). *Designing and conducting mixed method research* (3rd ed.). SAGE Publications. Retrieved from <https://www.pdfdrive.com/designing-and-conducting-mixed-methods-research-e196908993.html>
- Ghosh, B. (2011). Cultural Changes and Challenges in the Era of Globalization: The Case of India. *Journal of Developing Societies*, 27(2), 153-175. doi:10.1177/0169796X1102700203
- Gilsdorf, T. (2015). Gender, Culture And Ethnomathematics. *Proceedings of the Eighth International Conference on Mathematics Education and*, 1-10. Retrieved from https://www.researchgate.net/publication/281979816_Gender_culture_and_ethnomathematics
- Gopalan, V., & Vanleeuwen, B. (2015). A topological approach to creating any pulli kolam, an art form from South India. *Semantic Scholar*, 30 (1), 35-41. doi:10.5047/forma.2015.005
- Gosai, P. (2018). Rangoli: Dissemination of Indian Tradition & Cultural Values. *Aayushi International Interdisciplinary Research Journal (AIIRJ)*, 5(3), 235-238. Retrieved from https://www.aiirjournal.com/uploads/Articles/2018/03/3009_52.Poonam%20Gosai.pdf
- Hamzah, H., Ab. Karim, M. S., Othman, M., Hamzah, A., & Muhammad, N. H. (2015). Challenges in Sustaining the Malay Traditional Kuih among Youth. *International Journal of Social Science and Humanity*, 5(5), 472-478. doi:10.7763/IJSSH.2015.V5.502
- Hassi, A., & Storti, G. (2012). Globalization and Culture: The Three H Scenarios. In H. Cuadra-Montiel, *Globalization - Approaches to Diversity* (pp. 1-18). doi:10.5772/45655
- Horsthemke, K. (2006). *Ethnomathematics and Education: Some Thoughts. For the Learning of Mathematics*, 26(3), 15-19. Retrieved from <http://www.jstor.org/stable/40248542>
- Hussin, H. (2018). Branding Malaysia And Re-Positioning Cultural Heritage In Tourism Development. *JATI-Journal of Southeast Asian Studies*, 74-91. doi:10.22452/jati.sp2018no1.6
- Jagadisan, S. (2018). Safeguarding the Kolam Art Form: A Living Culture of. *International Journal of Humanities Social Sciences and Education (IJHSSE)*, 5(5), 56-66. doi:10.20431/2349-0381.0505008
- Johnson, K. (2005). Globalisation at the Crossroads of Tradition and Modernity in Rural India. *Sociological Bulletin*, 54(1), 40-58. doi:<https://doi.org/10.1177/0038022920050103>
- Jones, C. (2003). *Rangoli: Elder Women Creating Sacred Geography*. United States of America: TapDancing Lizard.

- Knigh, T. (2018). Craft, Performance, and Grammars. In J.-H. Lee, *Computational Studies on Cultural Variation and Heredity* (pp. 205-224). Massachusetts Institute of Technology, Cambridge, Massachusetts, USA. doi:10.1007/978-981-10-8189-7_16
- Krithivasan, K. (2016). A View Of India Through Kolam Patterns And Their Grammatical Representation. In P. Ghosh, *The Mind of an Engineer* (pp. 375-384). Springer Nature Singapore Pte. Ltd. doi:10.1007/978-981-10-0119-2_48
- Kumar, R. (2005). *Research Methodology: Astep by step guide for beginners*. (3rd, Ed.) New Delhi. Retrieved from http://www.sociology.kpi.ua/wp-content/uploads/2014/06/Ranjit_Kumar-Research_Methodology_A_Step-by-Step_G.pdf
- Laine, A. (2009). *In Conversation with the Kolam Practice: Auspiciousness and Artistic Experiences among Women in Tamilnadu, South India*. (Doctoral dissertation). University of Gothenburg, School of Global Studies. Retrieved from <https://gupea.ub.gu.se/handle/2077/19290>
- Lakshmipathy, S. (2016). *Visual Etnography: Kolam*. IIT , IDC, Bombay. Retrieved from <https://www.scribd.com/document/413386982/ACL7-Light>
- Letchumanan, S. (2013). *Kollum Dalam Perubahan Sosio Budaya Masyarakat India Di Malaysia*. (Unpublished master's thesis). Sultan Idris Education University, Tanjung Malim, Malaysia.
- Mallik, A., Chaudhury, S., Dinesh, T. B., & Chaluvaraj. (2013). An Intellectual Journey in History: Preserving Indian Cultural Heritage. *ICIAP 2013 Workshops*, 298–307. doi:10.1007/978-3-642-41190-8_32
- Nagata, S. (2015). Loop Patterns in Japan and Asia. *FORMA (The Society for Science on Form Japan)*, 30(1), 19-33. Retrieved from <http://www.scipress.org/journals/forma/frame/30.html>
- Nagta , S., & Thamburaj, R. (2006). Digitalization of Kolam Patterns and Tactile Kolam Tools. In *Formal Models, Languages and Applications* (pp. 354-363). World Scientific Publishing Co. Pte. Ltd. doi:10.1142/9789812773036_0024
- Naranan, S., Suresh, T. V., & Srinivasan, S. (2019). Kolam Designs Based on Fibonacci Series. *Nieuw Archief voor Wiskunde*, 195-204. Retrieved from <http://www.nieuwarchief.nl/serie5/pdf/naw5-2019-20-3-195.pdf>
- Negi, M., Rani, A., & Singh, A. (2015). New Horizon For Aipan (folk art of uttarakhand) Motifs Through Applique. *International Journal of Research Granthaalayah*, 1-14. Retrieved from [https://www.semanticscholar.org/paper/NEW-HORIZON-FOR-AIPAN-\(FOLK-ART-OF-UTTARAKHAND\)-Appliqu%C3%A9-Negi/302fffa5435fdc4993f4c4ebdd8903503d7fa9f0](https://www.semanticscholar.org/paper/NEW-HORIZON-FOR-AIPAN-(FOLK-ART-OF-UTTARAKHAND)-Appliqu%C3%A9-Negi/302fffa5435fdc4993f4c4ebdd8903503d7fa9f0)
- Omonov, Q., & Karimov, N. (2020). Importance Of Ancestral Heritage. *The American Journal of Social Science and Education Innovations*, 02(09), 196-202. doi:<https://doi.org/10.37547>
- Perumal, V. (2017). *Common Cultural Design Framework from Cultural Artefacts of Multi-Ethnic Society in Malaysia*. (Doctoral dissertation). UPM University, Selangor, Malaysia.
- Perumal, V., Abd Rahman, K. A., Effendi, R. R., Dolah, M., & Sinnappan, S. (2019). The Role Of Cultural Artefacts As A Tools To Mediate Common Cultural Practices In A Multi-Ethnic Society. *Alam Cipta*, 12(1), 33-37.
- Qin, Z., Song, Y., & Tian, Y. (2019). The Impact of Product Design with Traditional Cultural Properties (TCPs) on Consumer Behavior Through Cultural Perceptions: Evidence from the Young Chinese Generation. *MDPI Sustainability Journal*, 11(426), 1-17. doi:10.3390/su11020426
- Rahbarnia, Z., & Chadha, P. (2015). “Kolam” Hindu Earth Graffiti as Land Art in the Field of New Art. *The Scientific Journal of NAZAR research center (Nrc) for Art, Architecture & Urbanism*, 12(36), 1-19. Retrieved from <https://www.researchgate.net/publication/320036161>
- Rahman, K. A. (2014). Globalization and Cultural Transformation: The Case of Bangladesh. *Asian Culture and History*, 6(2), 1-11. doi:10.5539/ach.v6n2p1
- Raikhana, S., Moldakhmet, M., Ryskeldy, M., & Alua, M. (2014). The interaction of globalization and culture in the modern world. *Procedia-Social and Behavioral Sciences*, 122(1), 1-8. doi:<https://doi.org/10.1016/j.sbspro.2014.01.1294>

- Raj, A., Jhariya, M., & Toppo, P. (2014). Cow Dung For Ecofriendly And Sustainable Productive Farming. *International Journal of Scientific Research*, 3(10), 201-202. Retrieved from https://www.researchgate.net/publication/279951238_COW_DUNG_FOR_ECOFRIENDLY_AND_SUSTAINABLE_PRODUCTIVE_FARMING
- Ram, K. (2010). *Kolam A very Beautiful Art Work Of South India*. Retrieved from Kuzhalmannam Agraharam: <http://www.kuzhalmannamagraharam.info/articles/kolam.html>
- Ramji, P. (n.d.). *Pinterest*. Retrieved from etsy.com: <https://in.pinterest.com/pin/261982903311301671/>
- Ranade, P. (2016). Digital Convergence, Design and Revival of Indian Culture. *An Interdisciplinary Journal of Indian Studies*, 1(2), 45-56. Retrieved from http://www.indianstudies.net/V1/n2/08_digital_india.pdf
- Roy, A. (2013). *Kolam A Visual Culture of Southern India* (Powerpoint slide). Bangalore, Karnataka, India. Retrieved from https://issuu.com/abhishuroy/docs/kolam_doc
- Sachdev, G. (2019). Engaging with plants in an urban environment through street art and design. *New Phytologist Trust, Plants, People, Planets*, 1(3), 271-289. doi:10.1002/ppp3.10055
- Satpathy, B. B. (2015). *Indian Culture And Heritage* (Vol. 2). Bharathidashan Govt Colleget for Women, Puducherry, India. Retrieved from http://ddceutkal.ac.in/Syllabus/MA_history/paper-8.pdf
- Seetharaman, B., & Neela, S. (2013). Protein Kolam: An Artistic Rendition of Molecular Structure Data. *The MIT Press Journals*, 1-6. doi:10.2307/23468113
- SenGupta, J., & Deb, S. (2015). Smart Structure for Automated Rangoli. *Emerging Research in Computing, Information, Communication and Applications*, 1-10. doi:10.1007/978-81-322-2550-8_54
- Silverman, H., & Ruggles, D. (2008). Cultural Heritage. *International Journal of Cultural Property*, 15, 453-455. doi:10.1017/S0940739108080296
- Singh, K., Kumar, A., & Sharma, N. (2013). The Mathematical Aspects in Art to Create Decorative Effect in Design Patterns. *International Journal of Innovative Technology and Exploring Engineering (IJITE)*, 2(2), 36-39. Retrieved from https://www.researchgate.net/publication/323182804_The_Mathematical_Aspects_in_Art_to_Create_Decorative_Effect_in_Design_Patterns
- Smit, A. (2013). *'The Art of Belonging'Kolam as a Reflection of Women's Complex Relationswith Identity and Power in Contemporary India*. (Master Thesis). University Utrecht, Netherlands. Retrieved from <https://dspace.library.uu.nl/handle/1874/288442>
- Tadvalkar, N. (2013). Heiroglyphic Nature of Rangoli Art. *South Asian Association for Regional Cooperation*, 4(1), 65-75. Retrieved from http://saarcculture.org/wp-content/uploads/2016/02/journal_2013_vol4.pdf
- Taherdoost, H. (2016). Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. *SSRN Electronic Journal*, 5, 18-27. doi: 10.2139/ssrn.3205035
- Tapaswi, H. (2019). Everyday Aesthetics in Indian Cultural Communities. *Rupkatha Journal on Interdisciplinary Studies in Humanities*, 11(3), 1-12. doi:10.21659/rupkatha.v11n3.14
- Thakur, M. (2014). A Creative Expression of Celebrations: Rangoli. *International Journal of Research - GRANTHAALAYAH: Composition of Colours*, 1-3. Retrieved from <https://zenodo.org/record/887527#.Xoazh-ozbIU>
- Thirumurthy, V., & Simic-Muller, K. (2012). Kolam: A Mathematical Treasure of South India. *Childhood Education*, 88(5), 309-314. doi:10.1080/00094056.2012.718608
- Tiwary, S. K. (2017). Continuity of Art from Its Primitive Stage to Modern Times: A Brief Introduction of Ethno Rock Art Study Based on Rituals and Festivals. *Journal of Multidisciplinary Studies in Archaeology*, 5(1), 735-756. Retrieved from <https://scholar.google.com/citations?user=IKmMxy0AAAAJ&hl=en>
- UNESCO. (2018). *Intangible Cultural Heritage*. Retrieved from <https://ich.unesco.org/doc/src/01851-EN.pdf>
- Usha. (2020, December). *rangoli_usha*. Retrieved from <https://www.instagram.com/p/CJSbtQJhHeN/?igshid=psty52i09vo0>

- Waring, T. M. (2012). Sequential Encoding of Tamil Kolam Patterns. *Journal of Forma*, 27(1), 83-92. Retrieved from https://www.researchgate.net/publication/234116828_Sequential_Encoding_of_Tamil_Kolam_Patterns
- Yanagisawa, K., & Nagata, S. (2007). Fundamental Study on Design System of Kolam Pattern. *Forma*, 22(1), 31-46. Retrieved from <https://www.semanticscholar.org/paper/Fundamental-Study-on-Design-System-of-Kolam-Pattern-Yanagisawa-Nagata/65b2149dd9e1b8c98edcac692d2afe75369c795a>