MAPPING OF ETHNOGRAPHIC PATTERNS OF KADAZAN DUSUN COMMUNITY IN TAMBUNAN, SABAH USING GEOGRAPHIC INFORMATION SYSTEM (GIS)

Kong Teck Sieng[1], Oliver Valentine Eboy[1], Jacqueline Pugh-Kitingan[2]

[1]*Program Geografi, Fakulti Kemanusiaan Seni dan Warisan, Universiti Malaysia Sabah, Kota Kinabalu 88400, Sabah*
[2]*Program Antropologi dan Sosiologi, Fakulti Kemanusiaan Seni dan Warisan, Universiti Malaysia Sabah, Kota Kinabalu 88400, Sabah*

Email: kongtecksieng@yahoo.com

ABSTRACT

In this decade, the preservation of traditional heritage in the Kadazan Dusun community is an important step that must be emphasized in order for future generations to know and practice their ancestral cultures. The reason is that the Kadazan Dusun community has a unique diversity of legacy tradition. Additionally, more and more countries in the world make the legacy a key component of tourism development. Therefore, it would be a loss to the community as well as the country if the tradition's heritage is extinct from practicing. Currently, the Geographic Information System (GIS) has been introduced in preserving the traditional heritage because of its effectiveness in producing ethnographic maps. This study has mapped the ethnographic area of the Kadazan Dusun community and uses the GIS application to identify the ethnographic pattern of the community. Data from research projects in 2011 was used in this study. The result of this study shows the level of density of ethnographic patterns of the Kadazan Dusun community in Tambunan. The findings of this study provide exposure to the community, especially the Kadazan Dusun in respect of areas with high ethnographic density in Tambunan, thus promoting the area as a Cultural and Heritage Tourism site and also developing knowledge in the field of ethnographic mapping.

Keywords: Ethnographic; Mapping; Geographic Information Systems (GIS); Kadazan Dusun; Tourism; Patterns; Density

1. INTRODUCTION

In this modern time, we often hear anxieties feeling towards the new generation that has little knowledge in the area of traditional heritage. With modern technology influencing and affecting the mind and thought of the younger Y generation today, it is somewhat difficult to control to protect our youngsters who will be the heirs of future state leadership (Jabatan Warisan Negara, 2008). In fact, the attitude of the local community, which is less sensitive to the importance of cultural preservation, makes the application of ethnographic features within themselves (A. Latif and M. Sakif, 2005). Therefore, the efforts to preserve the traditional heritage are necessary and new culture important to be implemented in order to maintain its continuity in the future.

Heritage is a state treasury inherited from previous generations whether it is or was once owned by a community group in which it is a collective responsibility to be conserved and preserved (Jabatan Warisan Negara, 2009). Indeed, cultural heritage is important in influencing our feelings, identity, loyalty, and behaviour. If examined more deeply, the legacy of a society's tradition will have an impact on individual's identity, pride and

relationships with others as well as reflect the overall memory of the community and symbolize the civilization of a society (Gilliland *et. al,* 2015; Zuliskandar Ramli *et. al,* 2015).

Accordingly, culture can be represented by objects of art, paintings, monuments, and non-material manifestations such as language, dance, song, cuisine, custom, religion, landscape, literature, art, philosophy and television programs (Ogleby, 1995). In Sabah, the Kadazan Dusun community is known for its unique ethnographic features such as language, technology systems, economic systems, social organizations, knowledge systems, arts and religious systems that are the source and inspiration of their lives (Koentjaraningrat, 1990). Due to this privilege, the responsibility to preserve the traditional heritage needs to be shared by various government agencies as well as private and society as it should be for this mission to be achieved.

In regard to the above-mentioned issues, the preservation of traditional heritage is not a difficult task today. This is due to the presence of the Geographic Information System (GIS) as an efficient tool for preserving traditional heritage and subsequently, the maintenance of traditional heritage sites has become much easier. In reality, it is undeniable that GIS is an important tool in mapping the tradition's legacies, especially in tradition legacies that have tangible value to the unreal from a local perspective (Kasiannan, 2006). The reason is that the GIS is a computer system that has the capability to develop, store, manage and display geographic information such as data locating in the database (Barus and Wiradisastra, 2000).

Thus, this study was conducted to examine the pattern of ethnography distribution of Kadazan Dusun community in Tambunan district using GIS. This study produced an ethnographic pattern density map which is important to show the distribution of ethnographic features found in Tambunan. Consequently, the government and private agencies manage to identify the potential area with high ethnographic density that can attract tourists and subsequently, create cultural and heritage-based tourism areas.

In this context, this density map is important as a form of documentation to preserve the cultural heritage of the Kadazan Dusun community. Lastly, through tourism activities, the preservation of tradition's legacy could attract the public, enhances knowledge and creates a sense of appreciation for the historical background of the heritage elements (A. Ghafar Ahmad 2000; ICOMOS 2007).

2. ETHNOGRAPHY AND GIS

Ethnography comes from the word ethno (nation) and graphy (describing) which means the process of describing culture or cultural aspects (Moleong, 1990). Additionally, it is also a study of cultural anthropology which includes knowledge related to research techniques, ethnographic theories, and various cultural descriptions (Spradley, 1997). In other words, ethnography is the adventure of a culture or the practice of living within a particular community and explains a culture or any cultural aspect. Meanwhile, ethnographic mapping can be produced by reference to field work notes, transcripts from ethnographic observations and semi-structured interviews with respondents (Livingston *et. al,* 2016). In the meantime, the ethnographic map is a kind of mind map produced by the individual through the process of understanding and interpretation of the storytelling of the respondents to the social and physical environment (Tuan, 1975; Livingston *et. al,* 2016).

Whereas, Geographical Information Systems or better known as the GIS acronym is a tool for capturing, storing, checking, integrating, manipulating, analysing and displaying data related to the earth-oriented rollout (Ang, 2015). "System" is an environment that allows data management and provides answers to questions. "Information" is the ability to use the system to questions related to geographic databases. "Geography" refers to systems related to data involving measurement scales and can be referred to using the coordinate system located at locations on the surface of the earth (Martin, 1996).

Studies related to ethnographic mapping, especially ethnographic mapping using GIS, are less conducted in Borneo. Furthermore, due to limited skills and technology, the resulting ethnographic map has a limitation in the presentation of maps that indirectly cause map information to be ineffectively disseminated. For example, the study of ethnographic mapping conducted from previous study such as Obayashi (1990) which produced an ethnographic map of various ethnics that involves extensive areas in Asia and Oceania. The dots plotted on the map shows the distribution of an ethnicity but not expressed in the map which makes it difficult for readers to find out the distribution of ethnics in Asia and Oceania. Other studies such as ethnographic mapping using GIS produced by Lewis et. al, (2017) which represents linguistic map in Sabah, Malaysia. This map used the GIS application to display the distribution of language clusters used in an area of Sabah. However, the study involved extensive research areas and made it difficult for a specific area or small area.

Therefore, this study will produce a pattern map of ethnographic density as an improvement in previous studies.

3. RESEARCH AREA

The mapping of ethnographic density map of the Kadazan Dusun community is conducted in Tambunan. This study area was chosen as most of the population in this area still practiced the traditional culture inherited by their ancestors. Therefore, the objectives of the study which is to mapped the ethnographic area of Kadazan Dusun community is achievable in this area. Furthermore, the area has a population of 35,667, of which more than 30,000 residents in the area are Kadazan Dusun (Department of Statistics, 2010; Jacqueline, 2011). The location map of the study area can be seen in Figure 1.

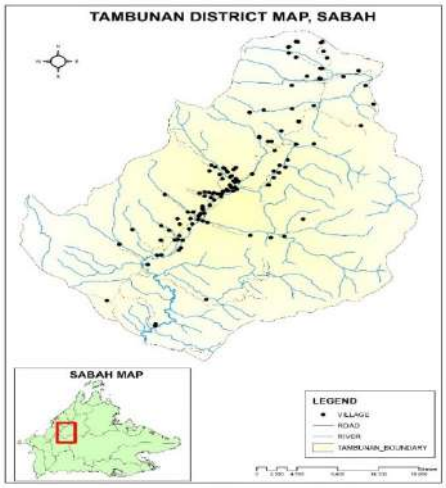

Figure 1: Location map of the study area

4. METHODOLOGY AND DATA OF STUDY

This study was based on the data obtained from the ethnographic and cultural mapping project in Tambunan district headed by Pugh- Kitingan (2011). These data were filtered through three processes: verification and data measurement, data cleaning and data format conversion. Subsequently, a database comprising spatial and attribute data were developed. Next, digitizing using ArcGIS was performed on the base map derived from the Sabah Land Surveyor Director (1975).

In the process of selecting the data for this study, there are some criteria that need to be follow as only data with variations were selected. One of the criteria was that the ethnographic feature should have the number of records of 45 and below. Secondly, the pattern of the ethnographic features must be clustered. To know the pattern of a data, spatial autocorrelation analyses were carried out to identify whether the pattern was dispersed, random or clustered. In other words, the ethnographic features data were selected if one of the criteria or both criteria were met accordingly. The process of conducting pattern analysis on the features of cultural, socio-economic and development ethnography is shown in Figure 2.

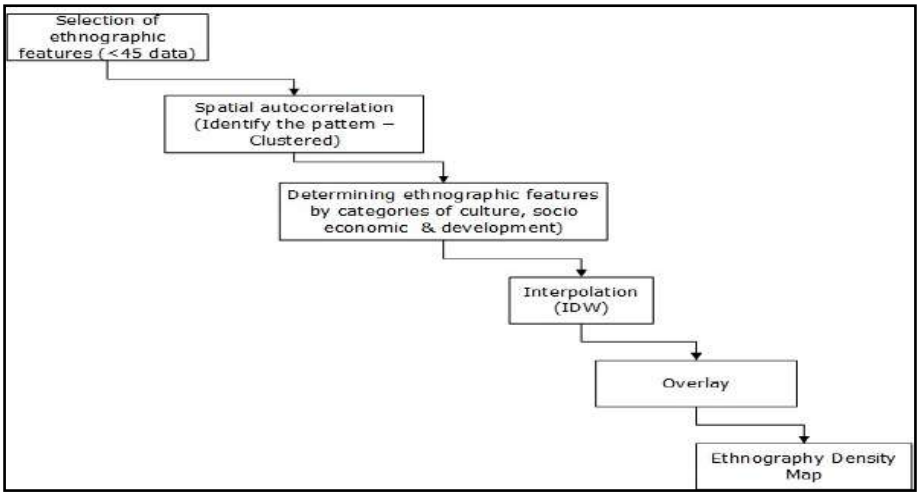

Figure 2: The process of pattern analysis on ethnographic features of culture, socio-economic and development

5. ANALYSIS

To obtain the results, the analysis has been done using spatial autocorrelation techniques, interpolation (IDW) techniques and overlay techniques. After selecting data that has a record number of 45 and below, spatial autocorrelation analysis techniques will be carried out. This analysis technique is to measure spatial autocorrelation based on its features and values for those data. From this analysis technique, result of pattern value whether clustered, dispersed or random can be identified. The results of the spatial autocorrelation technique analysis on one of the data showing the clustered pattern is shown in Figure 3.

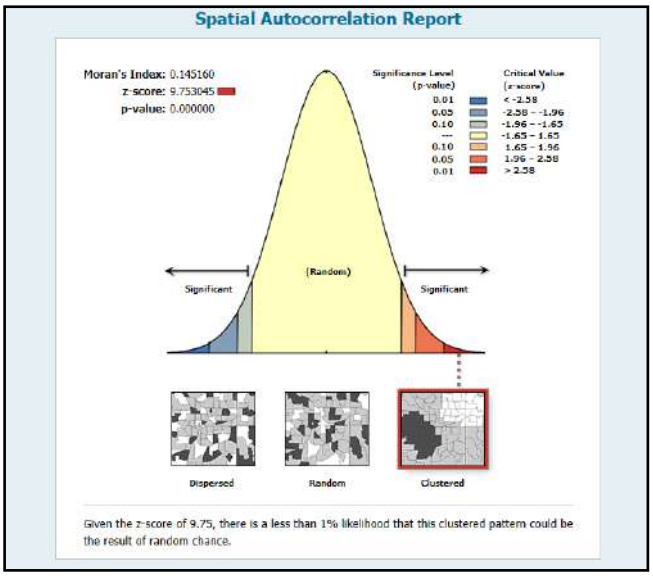

Figure 3: Results of the spatial autocorrelation technique on one of the data which indicate clustered pattern

For overlay technique, the overlay concept is based on the diagram in Figure 4. The overlay of the same group of ethnographic features for example the overlay between cultural ethnographic features, is known as low ethnographic density which represented in yellow colour. The overlay between two groups of different ethnographic features such as the cultural and socio-economic is known as the medium density ethnography represented in blue colour. The overlay between three groups of ethnographic features of culture, socio-economic and development are known as high ethnographic density represented in red colour.

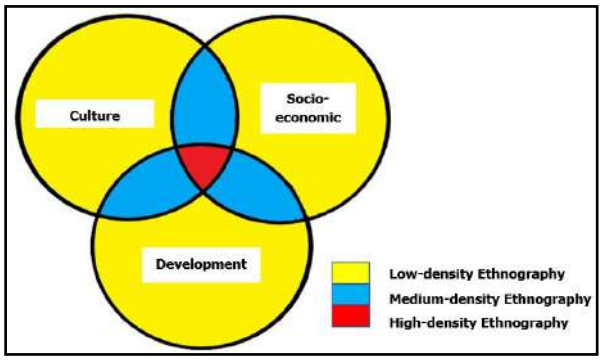

Figure 4: Concept of Overlay Technique

After identifying the patterns for the data that have the number of records of 45 and below using spatial autocorrelation techniques, the data will be determined into the ethnographic features group of cultural, socio-economic and development as shown in table 1. Then, the data will be analysed using interpolation technique (IDW) to identify the distribution pattern for the ethnographic features involved. Additionally, data which has less than less than 10 will be analysed using interpolation techniques without using spatial autocorrelation analysis techniques as the latter unable to analyse data which is less than ten.

Table 1: Ethnographic Features Data Engaged with Pattern Analysis

Bil.	Ethnographic features	Description	Dispersed/ Random/ Clustered	Selected ethnographic features data	Ethnographic Features Group
1.	Sigi	Traditional solo musical instruments	Random		Culture
2.	Sundatang	Traditional solo musical instruments	Random		
3.	Turali	Traditional solo musical instruments	Clustered	✓	
4.	Suling	Traditional solo musical instruments	Clustered	✓	
5.	Kowil	Traditional solo musical instruments	Clustered	✓	
6.	Sopogandangan	Gong	Clustered	✓	
7.	Karatung	Tool in a gong set	Clustered	✓	
8.	Tinindot	One kind of gong's music	Clustered	✓	
9.	Pongigalan	One kind of gong's music	Random		
10.	Muz_Kebumi	Burial music	Clustered	✓	
11.	Dunsai	Set gong music is used during burial	Clustered	✓	
12.	Togunggak	Bamboo tool sets	Clustered	✓	
13.	Tubau	Traditional game	Clustered	✓	
14.	Sukud	Traditional game	Clustered	✓	
15.	Migogol	Traditional game	Clustered	✓	
16.	Mibinti	Traditional game	Random		
17.	Mitutuk	Traditional game	Clustered		
18.	Radu	Traditional equipment	Clustered	✓	
19.	Guyangan	Traditional equipment	Clustered	✓	
20.	Tompohugi	Traditional equipment	Clustered		
21.	Bahaungan	A kind of basket	Clustered	✓	
22.	Boton	A kind of basket	Clustered	✓	
23.	Siud	A kind of basket	Clustered	✓	
24.	Tahum	A kind of webbing	Clustered	✓	
25.	Hampik	A kind of webbing	Clustered	✓	
26.	Linangkit	Traditional clothing characteristics	Clustered	✓	
27.	Sandai	Traditional clothing	Clustered	✓	

		characteristics			
28.	Miaboi	Nickname for engagement	Clustered		
29.	Mihaboi	Nickname for engagement	Clustered		
30.	Khidmat Kahwin	A man needs to work for his in-laws before marriage	Clustered	✓	
31.	Mongoi_Siwat	A man needs to work for his in-laws before marriage	Clustered	✓	
32.	Membantu menanam dan menuai padi	Help plant and harvest rice	Clustered	✓	
33.	Membantu membina rumah	Help foster home	Clustered	✓	
34.	Hadiah Selepas Kahwin	Present After Marriage	Clustered		
35.	Suhak	Present After Marriage	Clustered	✓	
36.	Sogit	Bloody custom penalties	Clustered	✓	
37.	Huguan	Name of traditional leader for Kadazan Dusun	Random		
38.	Ketua Adat	Customary head	Clustered		
39.	Moningolig	The type of traditional ceremony	Clustered	✓	
40.	Bil. Telefon Awam	Number of public phones	Random		Socio-Economic
41.	Bil. Telefon Rumah	Number of home phones	Clustered		
42.	Gereja	Church	Clustered		
43.	Chapel	Chapel	Random		
44.	Surau	Place worship for Muslims	Clustered		
45.	Masjid	Mosque	Dispersed		
46.	Tempat sembahyang yang lain	Another place of worship	Dispersed		
47.	Tadika	Kindergarten	Clustered	✓	
48.	Sekolah_Rendah	Primary school	Clustered	✓	
49.	Sekolah_Menengah	Secondary school	Random	✓	
50.	Klinik	Clinic	Random	✓	
51.	Hospital	Hospital	Random	✓	
52.	Klinik Bergerak	Mobile clinic	Random		
53.	Klinik Gigi	Dental clinic	Random		
54.	Flying Doctor	Flying Doctor	Dispersed		

55.	Jauh Kampung dari Sekolah	Distance of village from school	Clustered		
56.	2 jam jalan kaki	2 hours walk	Clustered		
57.	5 jam jalan kaki	5 hours walk	Clustered		
58.	1 hari jalan kaki	1 day walk	Random		
59.	Lebih satu hari jalan kaki	More than 1 day walk	Random		
60.	Keadaan jalan	Road condition	Clustered		
61.	Keadaan jalan lain	Another road condition	Clustered		
62.	Bilangan keluarga yang menanam padi sawah	Family numbers plant rice fields	Clustered		
63.	Luas kawasan padi bukit	Area of hill paddy cultivation area	Random		
64.	Bilangan keluarga yang menanam padi bukit	Family numbers plant hill paddy	Clustered		
65.	Bilangan keluarga menanam padi bukit guna tanah sendiri	The number of families planting hill paddy using their own land	Clustered		
66.	Tidak menanam Padi Baru	Not planting Padi Baru	Random	✓	
67.	Separuh menanam Padi Baru	Half planting Padi Baru	Clustered		
68.	Menanam Padi Baru sahaja	Plant Padi Baru only	Clustered		
69.	Pekali menanam Padi Baru dalam setahun	Coefficient of planting Padi Baru in a year	Clustered		
70.	Tempoh dari mengasok hingga mengatam Padi Baru	The period from supplying to rice harvesting	Clustered		
71.	Kelapa	Coconut	Clustered	✓	
72.	Kelapa Sawit	Palm oil	Clustered	✓	
73.	Tembakau	Tobacco	Clustered	✓	
74.	Kopi	Coffee	Clustered	✓	
75.	Jumlah orang ada kebun buah-buahan	The number of people has fruit garden	Random		
76.	Khinzir	Pig	Clustered		
77.	Kambing	Goat	Random		

78.	Angsa	Swan	Clustered	✓	
79.	Ayam belanda	Turkey	Random		
80.	Memburu lebih sekali sebulan	Hunting more than once a month	Random		
81.	Memburu satu kali sebulan	Hunting once a month	Clustered	✓	
82.	Memburu satu kali 3-6 bulan	Hunting once 3-6 months	Clustered	✓	
83.	Memburu satu kali 6-9 bulan	Hunting once 6-9 months	Random		
84.	Memburu satu kali setahun	Hunting once a year	Random		
85.	Mendapat Payau	Got deer	Clustered	✓	
86.	Mendapat Kijang	Got deer	Clustered	✓	
87.	Tempat menangkap ikan	Place to catch fish	Clustered	✓	
88.	Projek Kerajaan	Government project	Random		Development
89.	Homestay	Homestay	Clustered	✓	
90.	Resort	Resort	Random	✓	
91.	Hidroelektrik	Hydroelectric	Random	✓	
92.	Bengkel motor	Motor workshop	Clustered	✓	
93.	Kilang kayu	Wood factory	Random	✓	
94.	Kilang perabot bambu	Bamboo furniture factory	Random	✓	
95.	Kilang tapai	Tapai factory	Clustered	✓	
96.	Kedai tukang jahit	Sewing shop	Clustered	✓	
97.	Kedai gunting rambut	Barber shop	Random	✓	
98.	Projek kraftangan	Handicraft project	Random	✓	
99.	Bilangan anggota professional-Doktor	Number of professional members - Doctors	Random	✓	
100.	Bilangan anggota professional-Peguam	Number of professional members - Lawyer	Clustered	✓	
101.	Bilangan anggota professional-Padri	Number of professional members - Padri	Random		
102.	Bilangan anggota professional-Ustaz	Number of professional members - Ustaz	Clustered		
103.	Bilangan anggota professional-Sister	Number of professional members- Sister	Clustered		

104.	Bilangan anggota professional-Polis	Number of professional members- Police	Random		

Finally, the selected ethnographic features of the data as shown in Table 1 are select to conducted overlay analysis to produce ethnography density maps.

6. RESULT AND FINDINGS

Based on the ethnographic features density map pattern displayed in figure 5, it shows that a large group of high-density patterns is concentrated in the Tambunan's central area. This may be influenced by the high population located at Tambunan town situated in the central part of the Tambunan area. Other than that, the high-density area involved villages such as Piasau, Noudu, Tondulu, Lubang, Nambayan, Toboh and Kuala Kaingaran. While in the northern part of the Tambunan district, the density of the ethnographic features is only a few with villages such as Kirokot, Libang, Garas and Tontolob Liwan is located there. Furthermore, the southern and eastern regions of Tambunan have less density or no ethnographic featuress with high variation. The pattern is more scattered around the area which includes villages such as Tikolod, Kuala Monsok and Ulu Monsok. Ultimately, based on the analysis conducted, the ethnographic feature of development seems to have a significant influence on the high-density area in Tambunan. Ethnographic features such as homestay, factories, sewing shops and others are not much in the vicinity of Tambunan. This causes the pattern of high-density area size to be small compared to medium density and low density.

The names of the villages located in the high-density ethnography area of the Kadazan Dusun community in Tambunan, Sabah are shown in Table 2. Overall, there are 40 villages included in this list.

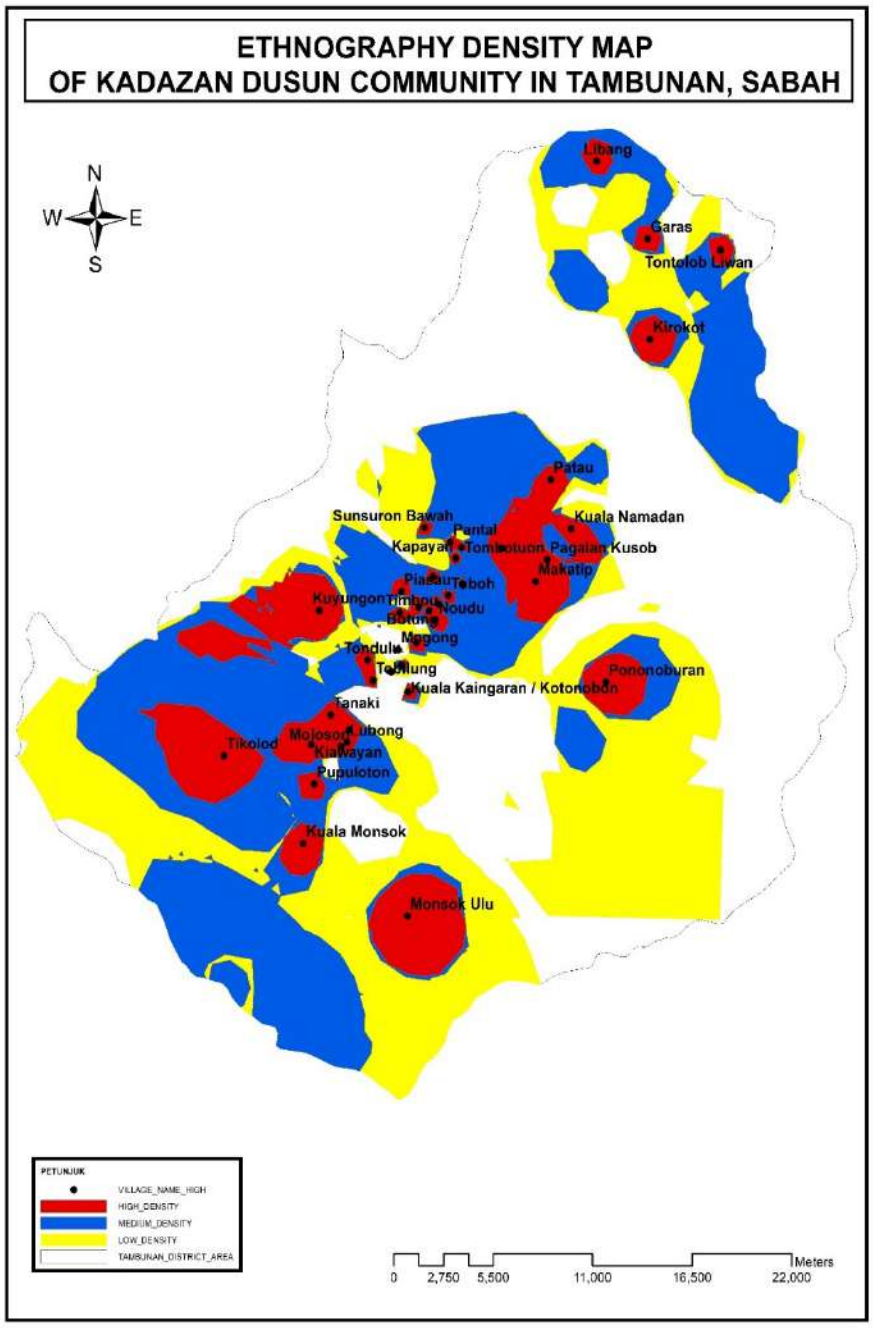

Figure 5: Ethnography Density Map of Kadazan Dusun Community In Tambunan, Sabah

Table 2: Village names included in the high-density ethnography area of the Kadazan Dusun community in Tambunan, Sabah

Bil.	Name of Village	Bil.	Name of Village
1.	Botung	21.	Nambayan
2.	Gagaraon	22.	Noudu
3.	Garas	23.	Pagalan Kusob
4.	Kapayan	24.	Pantal
5.	Karanaan	25.	Pekan Tambunan
6.	Kiawayan	26.	Piasau
7.	Kirokot	27.	Pomotodon
8.	Kituntul	28.	Pononoburan
9.	Kuala Kaingaran / Kotonobon	29.	Pupuloton
10.	Kuala Monsok	30.	Sunsuron Bawah
11.	Kuala Namadan	31.	Tanaki
12.	Kuyungon	32.	Tikolod
13.	Libang	33.	Timbou
14.	Lubong	34.	Tinompok
15.	Makatip	35.	Tobilung
16.	Mangi Pangi	36.	Toboh
17.	Minodung	37.	Tombotuon
18.	Mogong	38.	Tondulu
19.	Moloson	39.	Tontolob Liwan
20.	Monsok Ulu	40.	Patau

7. DISCUSSIONS

Based on the report by Pugh-Kitingan (2011), the villages within the high-density area have a high ethnographic feature and quite unique for the Kadazan Dusun community. For cultural ethnographic, the villages within the Mukim of Toboh, Lintuhun and Nambayan shows a unique presence in terms of the number of gongs which is more than the village in other Mukims. Besides that, the high-density area of the ethnographic feature can also be confirmed with the *sompoton* manufacturing centre located in the village of Tikolod. It is a popular *sompoton* making centre since the olden days as it spread to other villages in Tambunan. Next, for the socio-economic ethnography, the plantation of ginger, tobacco and palm oil can be found in the high-density area. The ginger plantation is considered as one of the distributors in Sabah. Furthermore, another ethnographic features that can be found in the high-density area is the fish pond which contribute the source of protein for the villagers in Tambunan. In terms of development ethnography, hydroelectric generator machines made by villagers in Kirokot and Moloson villages are the only creations in Tambunan. This creation is unique as it is manufactured using a kancil car engine. With the production of these machines, all the houses in the village have electricity without having to rely on electricity supply from the Sabah Electricity Board. Other than that, the high-density area also includes tourism resort located in Kuala Kaingaran, Kapayan and Karanaan villages. Therefore, with the support of the above statements, it is undeniable that this high-density area has a high ethnographic feature.

8. CONCLUSION

Overall, GIS is an effective tool for producing density maps of the ethnography of Kadazan Dusun community in Tambunan. The map indicates a low, medium and high-density pattern for ethnographic features. The villages located within the high-density patterns are rich in ethnographic features as can be seen from the support statements shown in the findings. Additionally, by using the density map, the location of a village with high ethnographic features can be easily identified. The area with high density ethnography features needs to be preserved to prevent any loss of cultural heritage.

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