Mapping of Public Places: Integration of Mobile Devices and Conventional Mapping to Investigate Place Identity in Muar, Malaysia

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Abstract: Advancement in technology provides new opportunities for mapping. Human factors need to be considered when implementing this advanced technology, mainly in the context of humans' perceptions and engagement. A combination of digital technology and conventional approaches offers possibilities to cater for different group of participants. This paper aims to highlight the roles of mapping technique as a tool to empower residents in identifying spaces that they believed to portray their local identity in Muar, the royal town of Johor. During the investigation of place identity in Muar, 150 participants were given choices to elicit their preferences by sketching polygons either via online software on an IPad or an A3 sized printed map. They were asked to identify places that located within the targeted area by referring to a provided list of 15 landscape features. The results were then processed using GIS in order to show spaces and places that are significant and contribute to the identity of place in Muar, as a modern royal town of Johor Sultanate, Malaysia.

Keywords: Place mapping, mobile devices, GIS, place identity

1 Introduction

Human has regarded map as a very powerful tool to demonstrate power, military strategy, the sovereignty of nations and claiming over one another resources (PÁNEK & VLOK 2013). From these political intentions, the use of maps changed tremendously to cater more common and practical aspects of human beings. In the past few decades, new approaches have emerged to support various kind of needs as more people realised how maps are effective and can be used to visualise social dimension, particularly in the policy-making process. The rise of technologies and tools such as GIS, google map, and interactive mobile devices have elevated mapping technique one step further when it regards to human and place interaction. This unique interaction is almost unidentifiable as it is made up of different layers of characteristics. These distinctive characteristics are associated with human's preferences, feelings and attachments as well as how a place could portray different meanings for people (KIL et al. 2012). This is where a particular group of people has cherished a place and how it is being perceived as part of their place identity. WESTER-HERBER (2004) and HOLMES & DEA (2012) summarised place identity as an intrinsic feeling that being shared and thus, hold people together as one entity, regardless their background differences.

Thus, the purpose of this research is to identify the people's perceptions and affections towards elements, spaces or places that they believed to represent their unique and distinctive characteristics of Muar as a royal town. PÁNEK (2017) provides new insights into integrating non-physical attributes such as social interaction and values into ArcGIS. Thus, the mapping will be more efficient to evoke the mutual relationships between place and social engagement (POWELL 2010). Other similar studies (e. g. STEPHENSON 2008, MAYES 2010, NUNTA &

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SAHACHAISAEREE 2012) have shown that place mapping has been used to investigate the uniqueness of a place's cultural values.

2 Case Study: Muar the Royal Town of Johor Sultanate, Malaysia

Historically, Muar is an old traditional town that was heavily influenced by colonial design, that initiated by a famous Johor's Malay ruler. The monarch, Sir Sultan Abu Bakar ibni Temenggong Daeng Ibrahim was known to be the "Father of Johor Modern" enthusiastically developed Muar as a town that had an English taste yet to suit with his Malay- Buginese ancestral identities (AHMAD et al. 2015). His taste for European lifestyle and architecture led to his brainchild of two important cities in Johor Sultanate, namely Johor Bahru as his royal town, to replace his old administrative centre in Singapore, and Muar as his satellite yet favourite town which later known as the Empress Town (ADIL 1971). As an ambitious ruler, during the 19th century, he invited Malays from nearby states and Chinese immigrants to settle down in his satellite town, which was aimed to prosper the local economic activities (SELAT 1986). Thus, with a potpourri of ethnicities, economic and cultural influences, Muar until now plays pivotal roles in portraying the identity of Modern Johor Sultanate.

However, only in 2012, his great-great-grandchild, Sultan Ibrahim ibn Almarhum Sultan Iskandar proclaimed Muar as his royal town commemorated the establishment of Modern Johor Sultanate in 1895 (BERNAMA 2016). In Malay civilisation, culturally a royal town ideally signifies a concept where a place is significantly perceived as a cradle of social, economic and cultural values of a Malay sultanate, where it also heavily influenced with the Sultan as a symbol for the place characteristics (HARUN et al. 2015). Nevertheless, Muar is an exception as it was never being built for this purpose. The proclamation was an issue in term of planning and development of future Muar as a royal town in term of identifying local characteristics that can be inferred the identity of Muar. Therefore, this paper aims to highlight the roles of mapping technique as a tool to empower residents in identifying spaces that they believed to portray their local identity. Besides, this process also helps to investigate the meaning of the places and how these identified places contribute to place-making of Muar as a modern royal town of Johor Sultanate in Malaysia.

3 Survey Methodology

3.1 Place Identification for Survey

A few observations had been conducted in several places around the towns purposely meant to identify the distribution of the participants based on their demographic factors. Thus, researcher managed to recognise two different spots that quite significant for the locals despite their background differences (Figure 1). Muar's only green areas famously known as Tanjung Emas Promenade and Muar's oldest bust station were the perfect areas to recruit the potential participants. These places located in different part of Muar town and has become landmarks for the Muar. The promenade's location was within the royal precinct area which is highly populated by the Malays. While the bus station is surrounded by a very urbanised

yet historic area is densely populated by the Chinese. These places somehow represent two different unique identities of the population in Muar.

Fig. 1: The map indicates the location of both promenade and bus station in Muar Town

3.2 Sampling

A free online mapping software known as Mapbox was used to depict the entire town area of Muar on IPad Pro 10.5 inch. Despite its effectiveness, portability and easy accessibility, the method was also savvy to the particular age group of targeted participants. Many of the respondents, mainly from 40 years old and above category were having difficulty to access and respond to the survey. The participants were asked to sketch polygon features on a map and numbering these features based on modification list of landscape features proposed by BROWN (2015) as shown in Table 1. In their studies, the authors were keen on looking into people preferences, values and meanings of the place based on how they perceived their environment. In this study, 'symbol' value was added to the list, aimed to provide place identification that holds the value of 'royalness' and 'symbolic' to Muar.

Initially, the method of using mobile devices managed to attract and engage young participants as they are more familiar with the technology. Later, based on the participant's mixed reactions, the researcher decided to support this hiccup by providing printed A3 sized maps for a participant who is not familiar with the mobile devices. The printed maps depicted the overall area of Muar town and stated with proposed urban landscape components of Kevin Lynch's Image of City such as nodes, edges, landmarks, streets and districts. The A3 size and these components were aimed to provide a better orientation and understanding for the participants during the survey.

Table 1: The proposed values to examine people and place interaction and also the meaning of the place

Number	Landscape value	Definition (meaning of the place)
1	Aesthetic	I value these areas because of its scenery
2	Economic	I value these areas because of economic properties such as business and tourism
3	Recreation	I value these areas because of their outdoor recreation activities
4	Life-sustaining	I value these areas because they are places that produce, preserve or contain clean water, soil and air
5	Learning value	I value these areas because we can learn about our environment
6	Biological diversity	I value these areas because they provide sanctuary for various flora and fauna
7	Spiritual	I value these areas because these places are sacred, holy and spiritually special for me
8	Intrinsic	I value these areas just because they exist, no matter what I or others think about them and how we use them
9	Historic	I value these areas because these places contain historical things such as natural and man-made things
10	Future	I value these places because they allow future generations to know and experience the areas as they are now
11	Subsistence	I value these areas because they provide necessary food and materials to sustain the community
12	Therapeutic	I value these areas because they make people feel better, physically and/or emotionally
13	Cultural	I value these areas because people can continue to pass down wisdom, traditions, and a way of life.
14	Wilderness	I value these areas because they are wild and natural
15	Symbol	I value these areas because they are symbolic and represent the whole place

3.3 Participant Recruitment

In addition to these places identification, the research followed a survey method proposed by ZAKARIYA et al. (2015). Their study provides some insights into how to conduct a survey in the context of Malaysian culture. Their study targeted respondents from three different blocks of time – morning, afternoon and evening. The procedure was aiming to engage with different groups of people in the public places. During the survey, the participants were recruited by using a simple random sampling method. They were stratified according to demographic factors such as age, gender, ethnicity, and education level.

Overall, the study succeeded to engage 150 participants from using both online mapping (20 participants) and conventional A3 sized printed mapping (130 participants) techniques. Both of the data gained from the survey were transferred into ArcGIS for further analysis stage. The online maps from Mapbox were converted into shapefile while findings from the A3 printed sized maps were scanned to export and coordinated these maps into GIS. Later, all

the shapes and numbering values produced by the participants were re-drawn again using polygon features in the software to support the analysis process.

4 Analysis and Results

The analysis process was taken into two steps, stimulated by the previous study by JANKOWSKI et al. (2016) in analysing public preference in prospective land use planning. The first step was to obtain a series of polygons that is capable of showing 15 landscape values that shared by one polygon, mainly represents a space, after the geoprocessing operations in GIS. During these operations, several *Union* operations were conducted to combine all the polygons provided by 150 participants. A *Dissolve* operation later being conducted to eliminate the numerous boundaries of overlaying shapefile polygons in each map into one unit that representing a new attribute and polygon's shape.Later, selected information from attributes table regarding the polygons that represent the different type of landscape values was selected one by one and later clustered as a group, purposely to illustrate the area and coverage of specific spaces. The spaces' importance were reflected by the coverage area of polygons marked within the identified area of Muar Town.

During these operations, the frequency values of polygons (FP) demarcated by the participants to denote the landscape values were counted. In addition to this, the percentage values (PP) of mapped polygons were calculated based on the frequency of marked polygons in each landscape values relative to the total number of polygons provided by the participants. The research to identify several overlapping polygons (OP) of different landscape values contributed by the participants. Therefore the number of these polygons had been counted to identify the percentage values (OPP) of overlapping polygons existed in the database.

Table 2: The distribution of polygons in 15 landscape values

Place values	Number of polygons (FP)	Percentage (%) of polygons (PP)	Number of overlapping polygons (OP)	Percentage (%) of overlapping polygons (OPP)
Aesthetic	465	7.89	96	1.63
Biological diversity	252	4.28	126	2.14
Cultural	384	6.52	120	2.04
Economic	600	10.19	94	1.60
Future	254	4.31	194	3.29
Historic	544	9.24	84	1.43
Intrinsic	400	6.79	204	3.46
Learning value	332	5.64	248	4.21
Life-sustaining	310	5.26	166	2.82
Recreation	386	6.55	154	2.61
Spiritual	446	7.57	94	1.60
Subsistence	366	6.21	122	2.07
Symbol	604	10.25	182	3.09
Therapeutic	320	5.43	262	4.45
Wilderness	236	4.01	212	3.60
Total	**5890**	**100**	**2358**	**40.03**

A total of 5890 polygons were drawn by the participants for this research. The values of the polygons (FP), the percentage of mapped polygons (PP), overlapping polygons (OP) and percentage of overlapping polygons (OPP) are presented in Table 2. The highest frequency distribution of mapped landscape values was symbol (FP = 604, PP = 10.25 %) almost a twice higher compared to biological diversity (FP = 252, PP = 4.28 %), future (FP = 254, PP = 4.31 %) and wilderness (FP = 236, PP = 4.01 %). The next most frequently mapped landscape values were economic (FP = 600, PP = 10.19 %), historic (FP = 544, PP = 9.24 %), spiritual (FP = 446, PP = 7.57 %), intrinsic (FP = 400, PP = 6.79 %), recreation (FP = 386, PP = 6.55 %) cultural (FP = 384, PP = 6.52 %) and subsistence (FP = 366, PP = 6.21 %). Other three different landscape values namely learning value (FP = 332, PP = 5.64 %), life-sustaining (FP = 310, PP = 5.26 %) and therapeutic (FP = 320, PP = 5.43 %) were almost equal in both number and percentage values.

However, therapeutic (OP = 262, OPP = 4.45 %) and learning-value (OP = 248, OPP = 4.21) were among the highest overlapping polygons drawn in the research. This is followed by wilderness (OP = 212, OPP = 3.60 %), intrinsic (OP = 204, OPP = 3.46 %) future (OP = 194, OPP = 3.29 %) and symbol (OP = 182, OPP = 3.09 %). Other landscape values namely life-sustaining (OP = 166, OPP = 2.82 %), recreation (OP = 154, OPP = 2.61 %), biological diversity (OP = 126, OPP = 2.14 %), subsistence (OP = 122, OPP = 2.07 %) and cultural (OP = 120, OPP = 2.04 %) were moderately drawn by the 150 participants. The less frequently mapped overlapping polygons were aesthetic (OP = 96, OPP = 1.63 %), economic (OP = 94, OPP = 1.60 %), spiritual (OP = 94, OPP = 1.60 %) and historic (OP = 84, OPP = 1.43 %).

In this second step, specifically, a series of *Union* overlay operations were conducted to overlay the 15 different maps. The goal was to create new polygon features that have similar boundaries and provided with perimeter and area values that can be initially inferred as places that hold unique values to the royal town of Muar. The map (Figure 2) below indicates the result gained from this process.

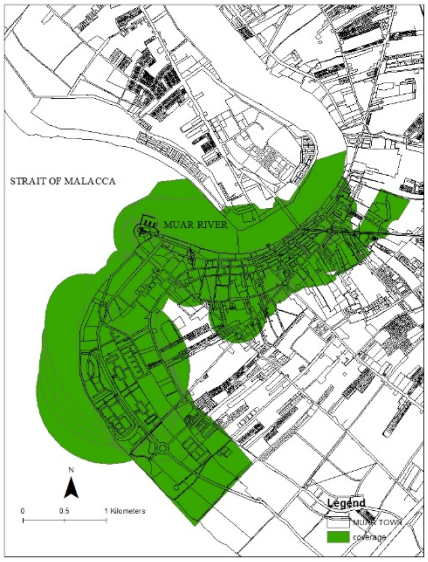

Fig. 2:
Places that hold special engagements and values to the people

The preliminary map represents the whole idea of how to visually interpret the place identity of Muar Town. Almost the entire royal precinct and old town areas were highly perceived as significant and unique to the people. To some extent, a vast mangrove forest, coastal area and river that hardly be accessed and located to nearby royal precinct and old town surprisingly, were projected by the process. Nevertheless, these places were spatially identified by the participants to be vital for them regarding their attachments. Thus, these highlighted areas in the maps could be suggested into the future planning of Muar's planning guidelines as part of the strategy to empowering people participation in decision-making process.

5 Conclusion

The mapping technique has been tremendously improved due to the robustness of technology. However, a limitation such as lack of accessibility to a specific group of society somehow can see as a disadvantage while conducting research. A solely based on technology somehow could lead to different obstacles associated with how far the familiarity and technology-literacy of a specific group in dealing with the latest technological method. In this case, the study had embraced both technological and conventional ways to reach a different group of participants. With an amalgamation of both future and conventional, the research was able to explore people's preferences, perceptions and attachment towards their surroundings as part of investigating the characteristics of place identity in Muar.

The relevancy of ArcGIS has become more and more where it could be used to visualise the intangible relationship between people and place. Furthermore, it could provide help to the planners, policy-makers and others to broaden their knowledge based on recognising the needs of the public participatory for identifying places that hold significant meanings from local perspectives. In addition, providing on aspects of landscape features that are easy to be understood by participants could increase the chances of gathering more information about their place attachment. The participants were able to highlight specific areas based on the provided landscape values that have been simplifying into easily identifiable and accessible to their knowledge and understanding. This is crucial, especially when dealing with a different group of people and backgrounds.

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