GEOGRAPHIC INFORMATION SYSTEM OF BATIK JAWA BARAT: CULTURAL AND INDUSTRIAL MAPPING FOR SUPPORTING THE DEVELOPMENT OF CURRICULUM IN VOCATIONAL HIGH SCHOOLS

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Abstract

This study aims to map out cultural and industrial aspects of Batik Jawa Barat using Geographic Information System (GIS) technology. This study brings such significance in an attempt to preserve and map out the potentials of Indonesia's batik which UNESCO claimed as intangible cultural heritage of humanity. The mapping is considered strategic for the existence of world heritage, particularly for Indonesian youth. In this study, a geographic information system method is administered. The data are collected from 64 batik industries in 18 cities in Jawa Barat (West Java) province. The results of the study show that the most developed Batik industries lie in the north and south parts of West Java. The information, which is related to the cultural and industrial mapping of Batik Jawa Barat, is actually useful to support the development of vocational high school curriculum. The contribution of the information is especially in relation with the development of students' competence through the implementation of industrial practicum nearby each vocational high school.

Keywords: Batik, Cultural and industrial mapping, Curriculum development, Geographic Information System, Vocational high school.

1. Introduction

For each country, culture is such a valuable asset that needs to be preserved since cultural asset is a nation's cultural identity which later becomes heritage for the youth. In the meantime, culture is defined as a series of values that are holistic for it comes from a holistic idea [1]. Culture is also a collective identity which can raise the pride of nation [2]. This condition implies that culture as an asset is in need of mapping, which is well-known as cultural mapping [3-6].

Cultural mapping is an instrument which functions to collect, locate, and systemize information focusing on distributing cultural expression [4]. It is considered as an approach that can classify and analyse community's cultural recourses [5]. To this relation, UNESCO recommends that cultural mapping become a mapping tool and technique to preserve both intangible and tangible cultural assets [2, 5]. In addition, cultural mapping can also be a cultural expression appearing as a safeguarding aspect for intangible and tangible cultural assets [2]. In terms of function, cultural mapping is very strategic to preserve a cultural identity. It makes intangible and tangible cultural assets more visible and understandable [6], has meaning, stories, memories, and values, enables people to personally connect to the place and space [7], creates and conserves [8], and tells stories about cultural diversity, historical figure, historical events, local cultural activity [9].

One of the popular mapping methods used in cultural assets is Geographic Information System (GIS). In relation to cultural mapping, GIS has a variety of cultural mapping indicators such as spatial analysis and potential area of utilization [10], data visualization [11], visualization ways to the past [12], mapping and clustering [13], and socially constructed space [11].

GIS describes digital humanities as a computation method in human research of humanities, including culture as digital story telling [11], a technology that can be made mapping in various digital tools such as web-based, cloud-based, and open source [13], and a representation of geospatial technology [14]. In the context of geospatial, GIS has a good data presentation that is relevant, complete, unique, and semantically accurate. Geospatial is scientific (testable, replicable) and authentic [12]. It is even predicted that in the future geospatial technology can accommodate big data [15]. Geospatial analysis can differentiate an area both internally and externally [16]. The analysis can also present the mapping of intangible and tangible cultural assets in a more actual form so that it can be a part of cultural education of a country.

Indonesia's Batik is cultural richness as well as a pride, which UNESCO claimed in 2009 as intangible and tangible cultural heritage of humanity. It was officially acclaimed as a world heritage on Decision of the Intergovernmental Committee: 4.COM 13.44. There are several important points of Indonesia's Batik as intangible cultural heritage of humanity as follows [17]:

R.1: Indonesian Batik has a rich symbolism related to social status, local community, nature, history and cultural heritage; provides Indonesian people with a sense of identity and continuity as an essential component of their life from birth to death; and continues to evolve without losing its traditional meaning;

R.2: Inscription on the Representative List would contribute to ensuring the visibility of intangible cultural heritage at the local, national and international

levels, raising awareness about its value and motivating practitioners, in particular younger generations, to continue its practice;

R.3: Various actors such as governmental and non-governmental institutions and community-based associations have jointly carried out safeguarding measures including awareness-raising, capacity-building and educational activities, and intend to continue these efforts;

R.4: The communities concerned were widely involved in the nomination process through field research in the communities; they also participated in the file preparation team and in a series of seminars to discuss the file contents, and provided their free, prior and informed consent;

R.5: The element is inscribed on the inventory of cultural elements maintained by the Department of Culture and Tourism of Republic of Indonesia.

The study specifically maps out batik in West Java in the context of cultural mapping. The study will also present the potentials of industrial mapping of Batik industry that has not been commonly studied. Indonesia's batik is not only well-known as a cultural product but also as a representation of an industry based on educated local wisdom. This potential is something vocation high schools can rely on, particularly on making Batik industry a place for practicum. Industrial mapping plays its role as a roadmap or systematic mapping study for the process of innovation, strategy, and policy development of vocational high schools in the future [18, 19]. In a more specific way, the data of cultural and industrial mapping will be useful for the development of curriculum of vocational high schools.

The development of competences of vocational high school students leads to spatial thinking [20], a knowledge leading the students to understand the good values of a local product that is relevant in every period, which can also develop lives based on local wisdom. In making batik, students of vocational high schools need to enhance their knowledge, understanding, and skills so that they are ready for the industry. Batik industry is not only an industry producing batik but also cultural conservation particularly for those involved in the industry. The industry is also a strength in economy based on local wisdom [21]. Batik industry and preservation is important to do so that batik as a cultural heritage and cultural richness can be inherited to the youth. That way, young generation will consider batik a pride as well as their identity.

This paper tries to utilize GIS technology for industrial mapping in a certain area in relation to curriculum development of vocational education. The issue in this paper is distinctive to other since GIS is usually utilized in a non-educational context. For instance, GIS is used in archeology to understand historical sites [4] and a humanized or meaning-laden' space [5]. GIS has also been used in an effort for environmental conservation [6-9], for accurate natural resources mapping [10, 11], and for industrial mapping in a certain area [12].

2. Method

This study uses Geographic Information System (GIS) method. The software used are ArcGIS 10.4 and Microsoft Excel. There are several steps in this study comprising 1) inventorying the addresses of batik local industries in West Java, 2) surveying the addresses using global positioning system (GPS), 3) inputting and tabulating the data of the coordinate location of the industry using Microsoft Excel, 4) determining the

industry on Google Earth to see the location in a wider scale, 5) importing the coordinate data from Excel to shp format using ArcGIS, and 6) symbolizing and making the layout of the industry distribution especially in West Java.

This study was conducted from January to May 2017 in West Java, Indonesia. There are 26 cities around 35,377.65 km^2. The number of batik industry involved is 64 lying around 18 cities within West Java province. In West Java, there are in fact more than 64 industries concerning with batik; however, only 64 of them willing to share their data contributing to the study. The process of data collection is conducted through a survey by visiting all the industries in West Java [22]. All the batik industries are categorized based on their location. After that the location is tracked and compiled based on each coordinate point which is important for the process of cultural and industrial mapping.

Data collection regarding the cultural and industrial mapping consists of the number of batik industry and year of establishment. Of 26 cities in West Java, 18 of them have batik industry. The number of industry for batik and their year of establishment are considered relevant to become the barometer in cultural mapping. Year of establishment of batik industry determines whether the industry belongs to traditional or contemporary type [23]. In the meantime, the number of batik industry available in an area, in this case West Java, is such valuable information for vocational high schools as industrial mapping so that they can identify the right place for practicum.

The mapping of Batik Jawa Barat in this study will be carried out in several zones. This is to make the process of cultural mapping easier. In the context of batik as national identity, each zone has different and unique characteristics varying from their patterns, colors, and inspiration. Figure 1 is the West Java map, which is the basis of each batik area zoning. In Fig. 1, the zoning is divided into non-coastal areas, northern coastal areas, and southern coastal areas.
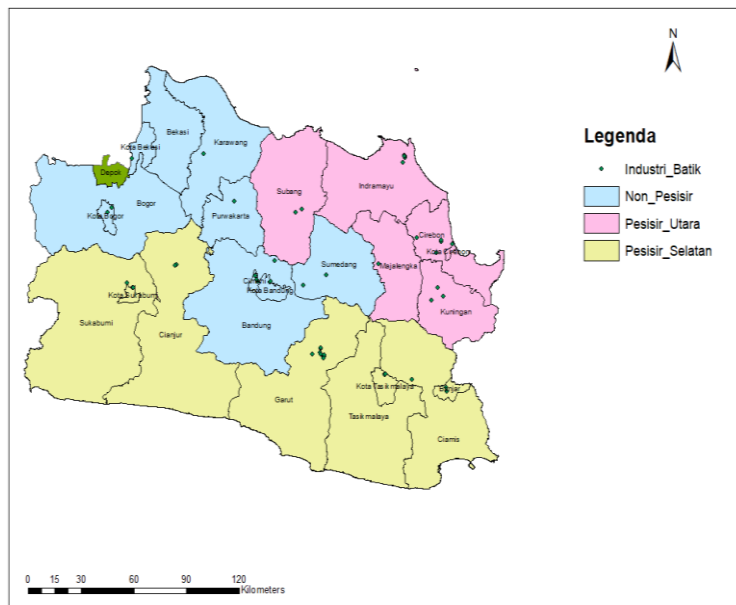
Fig. 1. West java batik zoning area.

Table 1 shows the zoning for cultural mapping in this study, which contains northern coastal and southern coastal areas of batik industry in West Java [24, 25]; there are eighteen cities in total, which belong to each zoning area of Batik industry displayed in Table 1.

The zone distribution as shown in Table 1 will be the major reference in analytical process of cultural mapping and industrial mapping. Zone 1 (southern coast Batik) consists of six areas. Zone 2 (northern coast Batik) has five areas, and zone 3 (non-coastal Batik) consists of seven areas.

Table 1. Batik zones based on batik industry areas.

No.	Industri Batik Area	Batik Zone
1	Batik Sukabumi	
2	Batik Cianjur	
3	Batik Garut	
4	Batik Tasikmalaya	Southern Coast Batik (Zone 1)
5	Batik Ciamis	
6	Batik Banjar	
7	Batik Cirebon	
8	Batik Kuningan	
9	Batik Majalengka	Northern Coast Batik (Zone 2)
10	Batik Indramayu	
11	Batik Subang	
12	Batik Bogor	
13	Batik Bekasi	
14	Batik Karawang	
15	Batik Purwakarta	Non-Coastal Batik (Zone 3)
16	Batik Cimahi	
17	Batik Bandung	
18	Batik Sumedang	

3. Results and Discussion

One of the abilities of GIS is to do mapping based on coordinate data resulted from survey. The data presentation itself is divided into two types comprising cultural and industrial mapping. Cultural mapping is related to year of establishment of batik industry depicting batik categorization. This categorization shows the richness of batik and whether it belongs to traditional or contemporary one. Other aspects in relation to cultural mapping are colors, patterns, and inspiration of a particular type of batik.

Meanwhile, industrial mapping in this study presents the number of batik industries in each area all around West Java. As mentioned earlier, this information will be valuable for vocational high schools with batik expertise program to identify right places for practicum. The information about the number of batik industries available within certain areas are the most valuable for curriculum developers in vocational high schools. In addition, the information is also valuable for government for evaluation process of vocational high schools and the availability of batik industries for practicum.

3.1. Cultural mapping of batik Jawa Barat

Cultural mapping of Batik Jawa Barat, as repeatedly mentioned earlier, is such valuable information in terms of year of establishment and products of batik. It is closely related to a cultural study aspect as a symbol of inherited tradition.

Generally, year of establishment of batik in West Java can be seen in Fig. 2. Based on periodization, the history of the development of batik is divided into three eras covering classical era (78-1512 M), Islamic era (1512-1945), and Indonesia's independence era (1945-recent) [26].

The year of establishment of batik in West Java lies 100% within the era of Indonesia's independence. Of 64 batik industries in West Java, the oldest types of batik are as follows "Rukun Batik Ciamis" from Ciamis, "Namira Batik" and "Batik Tulen" from Garut, both established in 1950 which also belong to the southern coast part, yet the newest one is "Gallery Menong" from Purwakarta which was established in 2016 in the non-coastal area. Tables 2, 3, and 4 explain in details information of year of establishment of batik in each zone consisting of northern coast are, southern coast area, and non-coastal area.

Table 2 shows the number of batik industries within the zone of southern coast area. The survey reveals that there are 26 industries in it. The oldest industry is named "Rukun Batik Ciamis" from Ciamis, "Namira Batik" and "Batik Tulen" both from Garut which were established in 1950. In the meantime, the newest batik industry is "Batik Sirung" in Garut.

Table 2. Year of establishment of batik industry within the southern coast part.

No.	Name of Batik Industry	City	Year of Establishment
1	Gendhies Batik	Banjar	2011
2	Batik Yola	Banjar	2010
3	Rukun Batik Ciamis	Ciamis	1950
4	Rumah Batik CK (Cicih Kurniasih)	Cianjur	2010
5	Batik Nusa Karya	Cianjur	2010
6	Batik Geulis	Sukabumi	2014
7	Batik Kenarie	Sukabumi	2011
8	Pondok Batik Kreasi Sukabumi	Sukabumi	2013
9	Batik Agnesa	Tasikmalaya	1972
10	Deden Batik	Tasikmalaya	2000
11	Dimas Batik	Tasikmalaya	1986
12	Melinda Batik	Tasikmalaya	1993
13	Batik Nagariharja	Tasikmalaya	2006
14	Nanda Batik	Tasikmalaya	2009
15	Batik Nurjaman	Tasikmalaya	1990
16	Batik Roni	Garut	2013
17	Batik Beken	Garut	1982
18	Namira Batik	Garut	1950
19	Batik Pudini	Garut	2009
20	Batik Rasya	Garut	2000
21	Batik Ratna Sari	Garut	1982
22	Batik R.P.G (Ralisa Putra Garut)	Garut	2002
23	Batik SHD	Garut	1974
24	Batik Sirung	Garut	2015
25	Batik Tulen	Garut	1950
26	Viera Batik & Tenun	Garut	2013

Table 3 shows the number of batik industries within the zone of northern coast area. The data from the survey reveals that there are 25 industries in this zone. The oldest batik industry in this zone is "Batik Ninik Ikhsan" from Cirebon and the newest one is "Pesona Batik" from the same city as Batik Ninik Ikhsan comes from.

Table 3. Year of establishment of batik industries within the zone of northern coast area.

No	Name of Batik Industry	City	Year of Establishment
1	Batik Annur	Cirebon	1994
2	Batik Ayunda	Cirebon	1997
3	Batik Ciwaringin	Cirebon	2008
4	Batik Hajir	Cirebon	2007
5	Batik Lia	Cirebon	2008
6	Batik Ninik Ikhsan	Cirebon	1974
7	Pesona Batik	Cirebon	2014
8	Batik Salma	Cirebon	2000
9	Batik Zhafirah	Cirebon	2006
10	Batik Bintang Arut	Indramayu	2006
11	Batik Dharma Ayu	Indramayu	1982
12	Batik Indra	Indramayu	1999
13	Batik Mulya (Printing)	Indramayu	2007
14	Batik Nofida	Indramayu	2012
15	Paoman Art Batik	Indramayu	1981
16	Batik Silva	Indramayu	1997
17	Batik Surya	Indramayu	2000
18	Batik Vivi	Indramayu	1995
19	Batik Wangi Asri	Indramayu	1989
20	Batik Dakor	Kungingan	2012
21	Batik Nisya Cikubangsari Kuningan	Kungingan	2008
22	Batik Paseban Cigugur	Kungingan	2006
23	Batik Herty Elit	Majalengka	1990
24	Batik Arves	Subang	2008
25	Gallery Batik Kareumbi	Subang	2012

Table 4 shows the number of batik industries in the zone of non-coastal area. There are 13 batik industries in this area. The oldest batik industry is "Hasan Batik" from Bandung Barat yet the newest one in this area is "Gallery Menong" coming from Purwakarta.

Table 4. Year of establishment of batik industries within the zone of non-coastal area.

No	Name of Batik Industry	City	Year of Establishment
1	Batik Seraci	Bekasi	2010
2	Batik Pancawati	Bogor	2014
3	Batik Tradisiku	Bogor	2008
4	Bale Batik Taza	Karawang	2008
5	Gallery Menong	Purwakarta	2016
6	Lembur batik Cimahi	Cimahi	2009
7	Batik Anggraeni	Cimahi	2009
8	Puri Batik "Sekar Putri"	Cimahi	2004
9	Rumah Batik Lembang	Bandung Barat	2005
10	Batik Komar	Bandung	1998
11	Hasan Batik	Bandung	1975
12	Sanggar Batik Umimay	Sumedang	2011
13	Batik Nafira	Sumedang	2010

3.2. Industrial mapping of batik Jawa Barat

Industrial mapping of Batik Jawa Barat has something to do with the availability of batik industries in West Java. The number of batik industries is an important indicator for preserving culture in the informal context. However, in the formal context, the number of batik industries plays an important role in enhancing the competence of students of vocational high schools through industrial practicum. Figure 2 shows the distribution of batik industries in West Java.

Figure 2 shows that the distribution of batik industries in West Java is quite interesting (the data have been obtained from the field survey done by the researchers of the paper). Both northern and southern coast areas have more batik industries than non-coastal area. This condition proves that the expansion of batik tradition initially came from coastal areas and has been influenced by Javanese culture [27]. This is understandable since Indonesia as a maritime country is a strategic place to expand batik tradition. The aspect of cultural mapping is also related to economic localization [28] of batik industry, in which the distribution and expansion of batik industry becomes a part of creative economy based on local wisdom.

The number of batik industries based on the zoning of coastal and non-coastal areas is generally dominated by batik industries both in northern and southern coastal areas. In southern coastal area, the industry lies on Sukabumi, Cianjur, Garut, Tasikmalaya, Ciamis, and Banjar with quite equal distribution. Of all those cities, Tasikmalaya is the city with the most industries and Ciamis is the city with the least one. Tasikmalaya becomes the city with the most industries of batik since it is considered the center of attention in southern coastal area [24] and the center of Batik in Priangan Timur [29]. In Tasikmalaya, there is an area namely "Kampung Batik" (which literally means batik village) where a lot of batik makers gather. The area is also projected to be the village of batik tourism in Tasikmalaya.
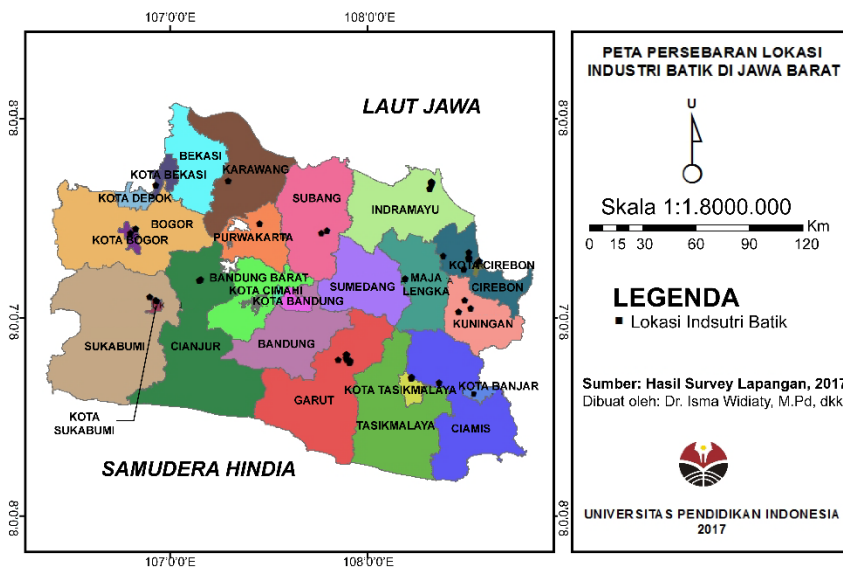

Fig. 2. ARG is application for mapping out Batik Jawa Barat.

Other cities in the southern part, particularly Cianjur and Sukabumi, started to develop their batik industry in 2010 to 2014. Banjar and Ciamis actually started their batik industry together with Tasikmalaya as shown in Fig. 2; however, in 1997, when monetary crisis happened, batik industry in both cities decreased. Unfortunately, the industry did not make its way back to glory after the crisis [24].

In the northern coastal area, the distribution mapping of batik industry shows that Cirebon and Indramayu are the most dominant cities. As Tasikmalaya does, Cirebon has also a batik village area called "Trusmi". Other cities such as Kuningan, Majalengka, and Subang started to develop their batik industry within the years of 2006-2012 (except Majalengka, its batik industry had actually been started since 1990).

In the last area, which is non-coastal, batik industry has started since 2008-2014 in such cities as Bogor, Bekasi, Karawang, Purwakarta, Cimahi, Bandung, and Sumedang. However, in Bandung there are the so-called Batik Komar which was established in 1998 and Batik Hasan which was established in 1975.

3.3. Industrial mapping of batik Jawa Barat to support the development of curriculum in vocational high schools

In this part, industrial mapping is in relation to the development of curriculum in vocational high schools. The availability of batik industry in West Java affects the process of curriculum evaluation and development in vocational high schools in the province.

Table 5 and Fig. 3 reveal the number and percentage of batik industry in West Java as mapping for supporting and revitalizing curriculum of vocational high schools. Such information is valuable for curriculum developers and policy makers in vocational high schools, especially those majoring in textile-related programs (batik). The validity of information can be such an effective way of evaluating the curriculum.
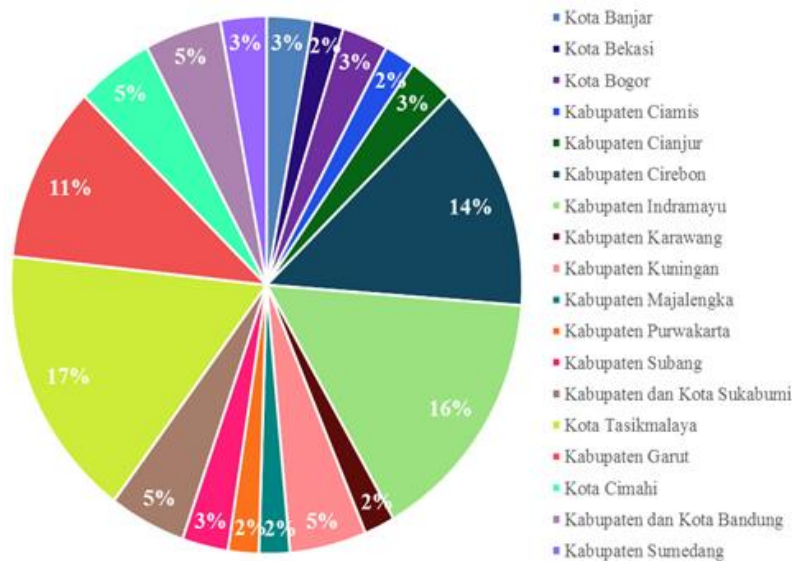

Fig. 3. Percentage of batik industries to support the development of curriculum in vocational high schools.

Table 5 shows that the existence of vocational high schools entails at least two categories: that there needs to be batik major and the needs to be addition of batik industry. Cities that need vocational high schools with more batik major are Garut and Indramayu while cities with the need of more batik industries are Karawang and Bandung. The existence of more batik industries plays an important role in education in the future, particularly in vocational schools [30].

Table 5. The number of batik industry and the existence of vocational high schools.

No	City	Number of Batik Industry	Vocational High Schools with Textile-Related Major (Batik)	Recommendation
1	Sukabumi	3	-	-
2	Cianjur	2	-	-
3	Garut	7	-	There needs to be VHS with batik major
4	Tasikmalaya	11	SMK Negeri 3 Tasikmalaya	-
5	Ciamis	1	-	-
6	Banjar	2	-	-
7	Cirebon	9	SMK Negeri 1 Gunung Jati Kab.Cirebon	-
8	Kuningan	3	-	-
9	Majalengka	1	-	-
10	Indramayu	10	-	There needs to be VHS with batik major
11	Subang	2	-	-
12	Bogor	2	-	-
13	Bekasi	1	-	-
14	Karawang	1	SMK Swasta Mathlaul Anwar	More batik industries are needed
15	Purwakarta	1	-	-
16	Cimahi	3	-	-
17	Bandung	3	SMK Negeri 14 Kota Bandung	More batik industries are needed
18	Batik Sumedang	2		

Figure 3 describes industrial mapping of Batik Jawa Barat more clearly. It shows that based on the zoning of the three areas, the top three Batik-producing cities are Tasikmalaya (southern coast batik), Indramayu (northern coast batik), and Cirebon (northern coast batik). This type of industry, which belongs to creative one, plays such a vital part for industrial mapping process [31].

One of the principles of curriculum development in vocational education is relevance. This principle is in relation to the importance of the harmony between

what is taught in the school and what is actually needed in the industry. Thus, such important aspects as the number of a certain industry or the competences needed in the industry such be taken into consideration when developing curriculum (1). The alignment of curriculum and industrial mapping leads to efficiency and effectiveness of building educational institutions in a particular area (2). In this context, the distribution of batik industry in every city in West Java should be considered by the government as evaluation of batik vocational high schools, either quantitatively or qualitatively. In addition, identifying learning outcome is closely related to curriculum developing planning in accordance with the existing industrial mapping (3). Cultural and industrial mapping will become a sort of guidance for curriculum developers of vocational education to design competences that are necessary in the industry.

4. Conclusion

Cultural mapping of Batik Jawa Barat based on year of establishment in West Java is important for categorization; whether it belongs to traditional or modern type of batik. The categorization is an important thing since it will be inherited to Indonesian youth. Other important aspect is about the inspiration of making batik patterns which can be such valuable information and education about natural recourses, custom, and art about a certain area, which, in this context, are areas in West Java. In the meantime, industrial mapping of Batik Jawa Barat regarding its function as a valuable asset for the development of education particularly in vocational high schools is very important since it gives valid information for the government to evaluate vocational high schools with and without batik major and whether there are adequate batik industries in a particular area. For curriculum developers, such information will give new insights on evaluating and revitalizing the curriculum.

Acknowledgments

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