

Spatial Analysis on Silk Weaving Industry of Sagaing

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Abstract

This research paper is “Spatial Analysis on Silk Weaving Industry of Sagaing”. In this research work, Sagaing is selected as the study area for its great potentiality for the development of silk weaving industry. Here, silk weaving industry of the study area is systematically analyzed from geographical point of views. As a geographical concept, spatial variations of silk weaving industry are studied by random sampling method and spatial distribution of silk weaving industry is determined by Anselin’s (Spatial Moran I), Cluster and Outliers Method. In analyzing the spatial concentration of silk weaving industry in Sagaing is based on Location Quotient Method by Durham NC. Moreover, in order to analyze the advantages and disadvantages of silk weaving industry, SWOT Analysis is used in this paper. According to theory, it can be said that silk weaving industry is one of the most important economic activities because it occupies the large proportion of secondary economic sector of Sagaing. Intending to the future sustainable development of silk weaving industry in Sagaing, some measures which should be under taken are discussed and suggested here.

Key words: Silk weaving industry, Cluster and Outliers Method, Location Quotient Method, sustainable development.

Introduction

Generally, weaving industry can be referred to as second most important things among the human needs: foods, clothes and shelter. Silk weaving industry means the industry that is involved with the breeding of silkworms and the manufacture of the silk they produce into thread and fabric.

The silk industry suffered as synthetics like nylon became more popular. Sagaing is one of the most important silk weaving industry areas in Mandalay Region.

This research paper entitled "Spatial Analysis on Silk Weaving Industry of Sagaing" emphasizes the spatial distribution of silk weaving industry and potential development of silk weaving industry in Sagaing.

The Study Area

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Sagaing is a town which includes in Sagaing Region. It lies on the south- west of Mandalay city. It lies between the latitudes of $21^{\circ} 51'$ North and $22^{\circ}57'$ North and the longitudes of $95^{\circ}13'$ and $96^{\circ}13''$ East. It is situated on the west bank of Ayeyarwady River.

It has an area of 12.61 Square miles or 8072 acres and is composed of (23) wards. Generally, it has a shape of elongated. Sagaing -Minwun range is located at north eastern part of the Sagaing. According to 2018 data, total population of the city is 78,338 and the largest population is found in Ywahtaung ward with 6,209 and the smallest population is found in Padamyar ward with 1,050. (Table 1)

It is selected as a study area for the following reasons. Various industries of Myanmar's traditional handicrafts are concentrated in Sagaing. Of these industries, silk weaving industry is famous for a long time. Most silk weaving industry is found in some wards located along the west bank of Ayeyarwady River and areas along Mandalay-Monywa Highway.

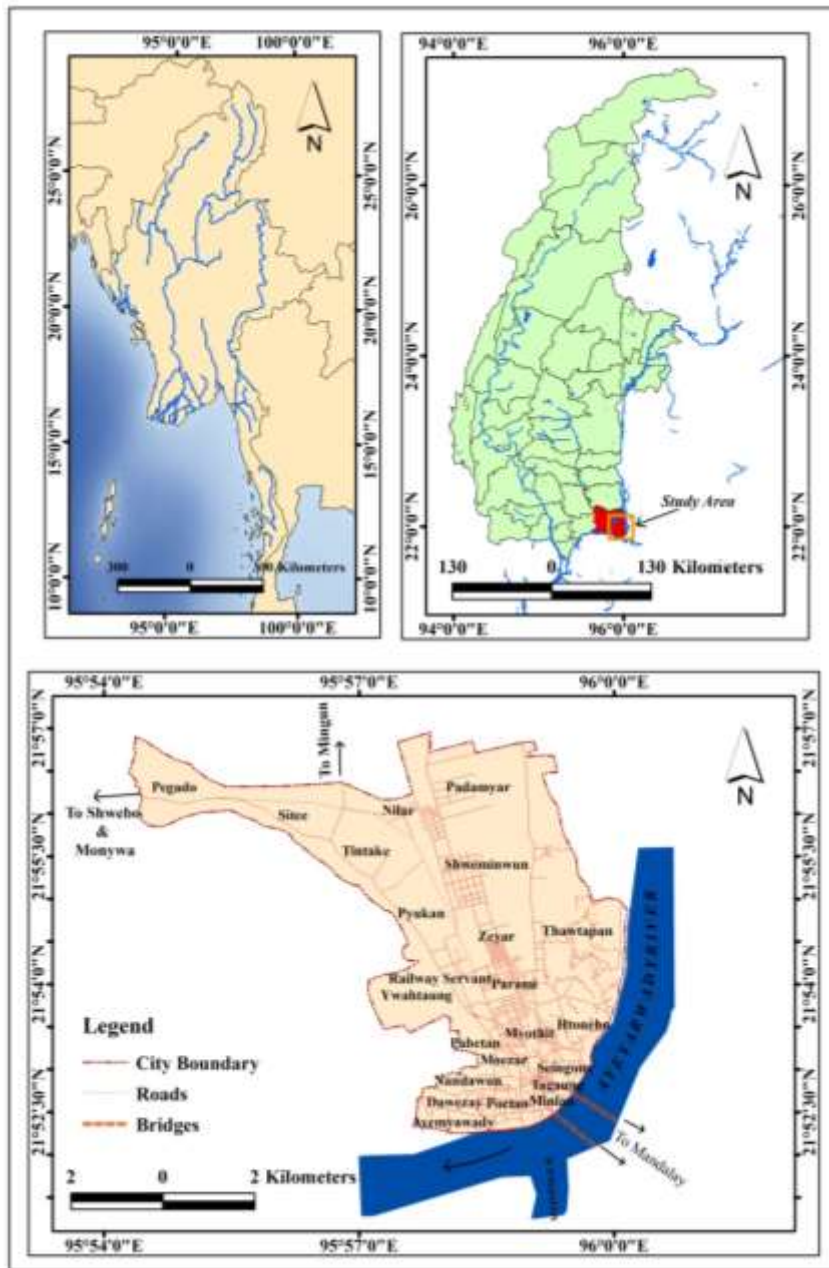


Figure 1. Location of Sagaing

Table 2.1. Distribution and Density of Population in Sagaing (2018)

No.	Wards	Area (sq.ml)	Population	Density (per sq.ml)
1	Dawezay	0.56	4,044	7,221
2	Ayemyawady	0.16	3,064	19,150
3	Nandawun	0.33	3,649	11,058

4	Moezar	0.09	3,041	33,789
5	Myothit	0.14	3,894	27,814
6	Pabetan	0.48	4,240	8,833
7	Poetan	0.28	3,590	12,821
8	Minlan	0.12	2,354	19,617
9	Tagaung	0.18	3,399	18,883
10	Seingone	0.29	4,509	15,548
11	Htonebo	0.15	1,918	12,787
12	Zeyar	0.33	4,393	13,312
13	Ywahtaung	0.98	6,209	6,336
14	Railway Servant	0.49	3,282	6,698
15	Shweminwun	0.92	5,432	5,904
16	Parami	0.41	1,695	4,134
17	Nilar	0.67	1,773	2,646
18	Padamyar	1.51	1,050	695
19	Pegado	0.75	2,961	3,948
20	Sitee	0.45	2,365	5,256
21	Tintake	1.08	4,928	4,563
22	Thawtapan	1.37	1,818	1,327
23	Pyukan	0.88	4,729	5,374
Total		12.61	78,338	6,212

Sources: Immigration and National Registration Department, Sagaing

Aim and objectives

The main aim of this research paper is to examine the spatial variation of silk weaving industry and to determine the potential development of silk weaving industry practiced in Sagaing.

The major objectives are as follows:

- To investigate spatial distribution of silk weaving industry in the study area.
- To determine potential development and industrial location of silk weaving in the study area
- To suggest some measures that can lead to develop the silk weaving industry of study area.

Methodology

Data used in this research paper were collected from both primary and secondary sources. In collection primary data, field observation is used by means of questionnaire survey, interview and informal talks with local people and government personnel. Secondary data were derived from various departments concerned, libraries, topographic maps and township records.

In this research paper, measurements are made by using quantitative and qualitative methods. As a quantitative analysis, the random sampling method is used. The spatial variation of silk weaving industry is determined by using Cluster and Outlier Analysis Method (Anselin's Moran I).

In analyzing, the spatial concentration of silk weaving industry in Sagaing is based on Location Quotient Method by Durham NC. Moreover, in order to analyze the advantages and disadvantages of silk weaving industry, SWOT Analysis is used in this paper.

Silk Weaving Industries of Sagaing

Silk weaving industry is one of the Myanmar's traditional handicraft industries. These famous and popular industries are done around Myanmar. Of these, Mandalay, Amarapura and Sagaing are the most famous for their silk weaving industries. Multi-patterns and various designs as well as modern designs of silk longyi have been produced in these regions for a long time. The properties of silk longyi are long-lasting and high values. These famous silk weaving industries have been maintained in Sagaing for hundreds of years. For modernized designs and fashions, silk longyis are crazily worn. Silk weaving industry was introduced by two sisters called Daw Nyar and Daw Tin as a subsistence living. Later, it reached to foreign market as an export.

Raw material sources

Raw materials for silk weaving industry are purchased from the markets of Amarapura where various items of weaving implements are easily available. Raw silk yarns are imported into the region from internal market such as Taunggyi, Inlay and from external markets such as China, India and so on.

Production and processing

Dyeing Work

Silk yarns which are the raw materials of dyeing industry could not be directly colored by the chemical dyes. Before dyeing them, they are ruffled, blanched and immersed in water mixing with white indigo to brighten up the color.

First, the silk skeins are spread and immersed in the water to ruffle. Only after ruffling with the water, the dyes can be spread evenly on the silk yarns or skein.

Mostly, silk yarns are covered with the wax-like risen or glue and dirt. Only if the risen or glue and dirt are cleansed the color of the silk yarn will become brilliant and the weight of it will become light. So they are cleansed, by the detergent powder. There are two types of cleaning method. The method of cleaning the glue or risen and dirt from the yarns by immersing in soap water is called *Wet out Method* and that of cleaning the glue or risen and dirt from the yarns by immersing in soap water is called *Boiling out Method*. Although both types are used in some industries, most industries use only the *Boiling out Method*.

After cleaning, silk skein or yarns have yellowish color and it is required to make blanching and whitening. Skein or yarns are blanched by immersing in the water, which is mixed by the blanching powder for about 1 to 2 hours. As the blanching powder can be damage and decay the yarns, yarns should be washed by water, which is mixed by sulfuric acid, for about two or three times in order to remove out the blanching powder.

In order to get white and bright color, the blanched yarns are immersed in the water containing any whitening agent such white indigo for about one hour. After soaking the whitening materials, the white cotton yarns can be obtained.

After carrying out the above stages, the dyeing industry can be carried on. As there are many types of chemical dyes, the methods of dyeing are different and the quality of brilliance and fastness of color of the dyes are also not the same from one dyeing industry to another.

Average number of private entrepreneurs who put their silk yarns to dye was 15 to 20 persons per week. The charge for silk dyeing is 6000 kyats for a viss of yarns and a dyeing industry can dye one to three viss of silk yarns per day.

Weaving Work

Weaving work is the last stage in silk textile industry. In the weaving work, starching a silk skein of yarn, transferring silk yarn from a swift to a bobbin, rotating the swift by hand, drawing silk threads through the heddle, drawing the silk threads into the reed, winding threads onto the bobbing and weaving the silk cloths are carried out step by step.

Finally, after the weaving of cloths, the woven silk clothes are inspected, combed, folded and labeled with brands and then are sent to shopping centers.

Design Patterns of Silk Cloth

Before weaving the silk yarns, required design patterns for silk cloths are created by skilled labour. There are various design patterns in silk cloths. They are the three-stripe pattern (Thonzinkyo), the twisted three-stripe pattern (Thonzinlein), the branch pattern (Akhet), the smart pattern (Saungdawku), the big-string pattern (Kyogyi), the twisted one-stripe pattern (Dazinlein), one-stripe pattern (Dazinkyo) and the multi-branch pattern (Akhetsou). Furthermore, various modernized design patterns are also woven in the study area.

Products and Trade

The products of silk weaving industry in Sagaing are sold to local markets such as Yangon, Mandalay, Amarapura and so on. As a foreign market, orders for silk cloths from Thailand are also received by weaving entrepreneurs. Silk cloth shopping centres are Theingyisan, Pyidawaye and Shwesanein in Seingone ward, Shwelunein and Natbagyi in Pabetan ward, Pyaisonthu, Nantawwin, Shwepoein in Poetan ward, Shwehninsi in Kyauksit ward, and Chantha in Ootanlay ward.

Active selling of silk cloths occurs in September and October when Myanmar traditional donation ceremonies and convocation are held. The selling of silk cloths decline in Waso months and most woven silk cloths are often stored in warehouse.

The fixed price for the curlicue-pattern of silk cloth woven by 100 looms (Loonyaryaw Achei Longyi) is averagely worth about one to three lakhs in kyats.

Investment

The price of a viss of silk yarn is 120000 kyats and average weaving cost is between 250000 kyats and 300000 kyats. Small entrepreneurs own averagely 5 looms, but some have over 20 looms. According to 2018 data, there were 76 waving industries in Seingon ward, of which one possessed 50 looms, 3 owned 10 looms and remaining industries run the weaving works with one loom.

Labour Force

In such types of industries, at least two workers are needed for one loom. There were over 20 workers in large weaving industries. An average labour cost varies from 80,000 to 105,000 Kyats. Time spent for one woven cloth also varies from 15 days to one month. The skilled labour for designing silk pattern may cost 50,000 kyats for one pattern.

According to field survey data, there were (40) silk weaving industries and (367) employees engaging in silk weaving industry of Sagaing. Seingone ward was the highest and covers about (67.5 %) of the total industries. Labour force was also the second highest in weaving industry and (35.14%) of employees engaged in the silk weaving industry.

So, one can be said that silk weaving industry is one of the most important economic activities because they occupy the large proportion of secondary economic sector of Sagaing.

Analysis on Spatial Distribution of Silk Weaving Industry

Spatial distribution of silk weaving Industry in Sagaing is analyzed by fined Cluster and Outlier Method: Anselin's Spatial Moran (I).

There are 23 quarters in Sagaing. Among them, five quarters are practicing the silk weaving industry. In studying the spatial variation of silk weaving industry, the largest industries were found in Seingone ward. According to table (2), there were 89 silk weaving industry in Sagaing, 76 in Seingone ward, five in Zeyar ward, three in Myothit and Htonebo ward, and two in Poetan ward, respectively. Of the total wards of silk weaving industry, 85.39% was occupied by Seingone ward, 5.61% by Zeyar ward, 3.37% by Htonebo ward and Myothit ward and 2.24% by Poetan ward respectively.

According to the figure (2), Seingone ward is the largest silk weaving industry. The least silk weaving industries are found in Poetan ward. Of the 76 silk weaving industry in Seingone ward, 85.39% are concentrating in the areas along the east bank of Ayeyarwady River. Some factors that cause the high cluster concentration of silk weaving industry are easily available raw materials, advantaging the location for the site of industries, easy access to labour forces, being traditional livelihoods. Sparsely distribution of silk weaving industry is found in the middle part of Seingone. It is due to substitute of other economic activities instead of silk weaving works. Other low concentrated areas of silk weaving industry are Zeyar ward, Htonebo ward, Poetan ward and Myothit ward. Spatial variation of silk weaving industry in the study area is shown in Table (2) and Figure (2).

The spatial concentration of private entrepreneur concerning with silk weaving industry is analyzed by using the index of Location Quotients. Of the 5 weaving wards, 67.5 % of silk weaving industry are concentrated in Seingone ward, 12.5 % were in Zeyar ward and 6.67 % in each ward of Poetan, Myothit and Htonebo.

Table 2. Ward-wise Distribution of Silk Weaving Industry in Sagaing

No	Wards	Industry of Number	% of Total
1.	Seingone	76	85.39

2.	Zeyar	5	5.62
3.	Myothit	3	3.37
4.	Htonebo	3	3.37
5.	Poetan	2	2.25
	Total	89	100

Source: Computed by Researcher

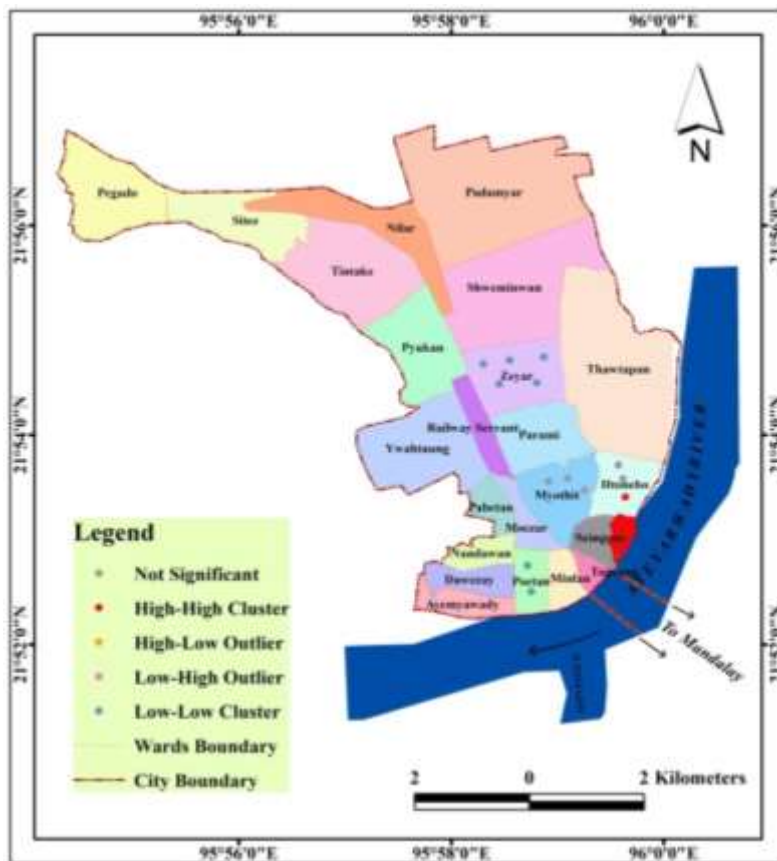


Figure 2 Spatial Distribution of Silk Weaving Industry in Sagaing

Source: Compiled by the researcher

According to calculated results of Location Quotients method, spatial concentration of private entrepreneur can be classified into three groups: high concentrated area, medium concentrated area and low concentrated area. (Table 3) and Table 4)

Therefore, it can be concluded that silk weaving industry in Seingone ward is more prosperous than the others. (Figure 3)

Table 3. Ward-wise Distribution of Silk Weaving Industry, Owner and Labors in Sagaing

No	Wards	Owner	% of Total	workers	% of Total
1.	Seingone	27	67.5	129	35.14
2.	Poetan	2	5.00	140	38.15
3.	Myothit	3	7.5	26	7.08
4.	Zeyar	5	12.5	58	15.80
5.	Htonebo	3	7.5	14	3.81
	Total	40	100	367	100

Source: Compute by Researcher

Table 4. Silk Weaving industry by using Location Quotient

No.	Group	Number of Industry
1	High Concentrated Area	Over 10
2	Medium Concentrated Area	5 - 10
3	Low Concentrated Area	Less than 5

Source: Computed by Researcher

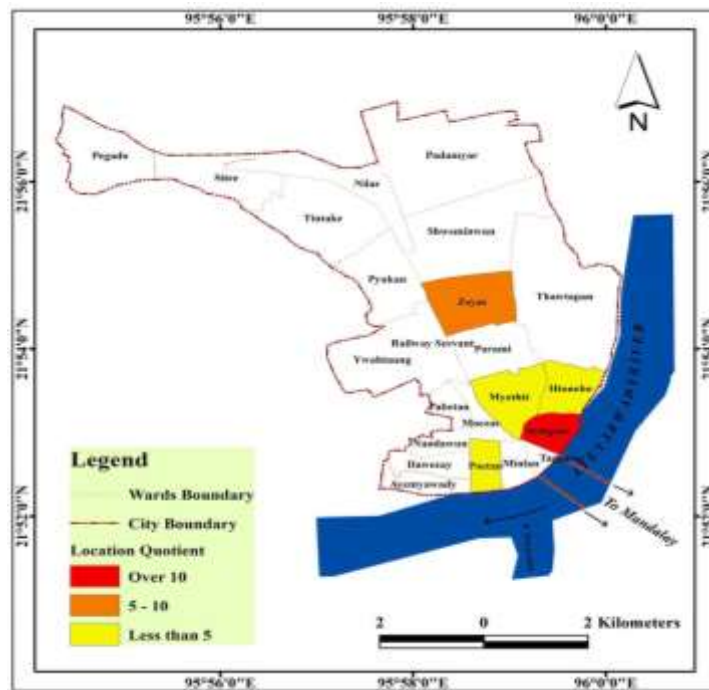


Figure 3 Spatial Concentration of Owner in Silk Weaving Industry in Sagaing

Source: Computed by the researcher

S.W.O.T Analysis for Silk Weaving Industries of Sagaing

In order to analyze the silk weaving industry, it is necessary to examine advantages and disadvantages for the sustainable development of silk weaving sector. One of the methods to analyze these advantages and disadvantage is the S.W.O.T analysis.

S.W.O.T analysis is a frame work used to evaluate competitive position of an entity usually a business though it can be a place, industry or product by identifying its strengths, weakness, opportunities and threats. S.W.O.T analysis can be presented as a square with each of the four areas making up a quadrant. This visual arrangement provides a quick overview of the attribute's position.

For application of S.W.O.T analysis one needs to know about good and bad points. It is also necessary to analyze real life conditions of a matter. S.W.O.T analysis must be short and simple by according complexity and over emphasizing because much of the information is subjective.

Strengths describe what an organization excels at and separate it from the competition.

Weaknesses stop or prevent an organization from performing at optimum level. They are areas where the business needs to improve to remain competitive.

Opportunities refer to favorable external factors that an organization can use to give it a competitive advantage.

Threats refer to factors that have the potential to harm an organization.

S.W.O.T analysis is a great way to guide management strategy meetings. It is powerful to discuss the organizations core strengths and weaknesses and then move from there to defining the opportunities and threats and finally confirming the idea S.W.O.T analysis can reflect the unaware factors for the group's input.

Strengths

- Wearing silk longyi is still alive for Myanmar culture as official uniform and auspicious ceremonies.
- The development of silk weaving industry can lead to the development of other related industries.
- At present, other related industries to silk weaving industry are also developing in the study area. For example, dyeing works, computer embroidery works, tailoring works for male and female longyi and silk cloth shopping centers increase in the study area.

Weaknesses

- As a drawback, the development of silk weaving industries can bring the environmental problems such as water pollution, air pollution and even noise pollution.
- Net income derived from silk weaving work does not meet the basic needs for the labour. Skilled labour in this industries search for other works for their livelihoods.
- Although the development of silk weaving industry in Sagaing is partly related to the market demand, raw material, skilled labour, productive power and advanced technology, the silk weaving industries sometimes face with shortages of raw materials and skilled labour.
- Nearly all of the silk weaving industries depend on the raw materials made in China and price of skein and yarn also depends upon the foreign exchange transactions between Myanmar and China.
- In promoting the private silk weaving industry, power supplies are essential in silk weaving industries. But, silk weaving industries in the study area often face with power shortage, one of the major weaknesses.
- Only old-model handlooms and old weaving methods are used in silk weaving industry.

Opportunities

- Most of the women who dwell in the town engage mainly in silk weaving industry.
- As the silk weaving work is under the shelter, some aged- women have been comfortable, get extra income and self-confidence.
- The development of silk weaving industry can also lead to job opportunities.
- As the development of silk weaving industry is also governed by human resource, knowledge, experiences, population factors are extremely important to promote the development of silk weaving industry in Sagaing.

Threats

- To get a high profit, the capability of local yarn production is essential because local entrepreneurs mostly rely on the yarn imported from external countries like China and India.
- Recently, cheap priced woven cloths of male and female silk longyis were imported from China and Thailand.
- Local silk woven products with high quality and high price cannot compete the cheap-price and low quality woven cloths imported by foreign countries like China and Thailand.
- Therefore, in long term competition, local silk weaving industry can decrease or even disappear in the silk weaving industry sector.

Findings and Result

Findings

Performance of economic activities for production and services is intended to promote the economic conditions of a person as well as his or her social status in the community. The more production one can perform, the more income one can gain. So, one can have the economic and social benefits. Moreover, the more products required by consumers one can sell with profits, the greater the demand from the consumer's is. Thus one can get the more profits from the production. The development of silk weaving industry differs from one place to another. In studying the silk weaving industry of Sagaing, major findings are as follows.

- The groups of silk weaving industry are mostly found near the Ayeyarwady River.
- 85% of the total silk weaving industry established in Seingone ward, especially, the cluster in the eastern parts of Seingone ward higher than the others. Because this area lies near the Ayeyarwady River for water resource. Moreover, silk weaving industry has been done at this area since ancient time. Therefore, Seingone area is the most development of silk weaving industry in Sagaing.
- Development of silk weaving industry in Sagaing, can give the job opportunities for the local peoples.
- Human resource development is important for the development of silk weaving industry in Sagaing because silk weaving industry rely on skillful Labour.

Result

After studying the silk weaving industry of Sagaing, it can be said that silk weaving industry is one of the most important economic activities because they occupy the large proportion of secondary economic sector of Sagaing. Of the 5 weaving wards of Sagaing, the silk weaving industry is more developed in Seingone ward than the others.

The largest numbers of silk weaving industry are concentrated in the areas along the east bank of Ayeyarwady River where raw materials can be easily available. Furthermore, the location for the site of industry has an advantage and skilled labour forces can be easily available.

Conclusion

Sagaing lies on the flat alluvial plain which is constructed by the Ayeyarwady River and its tributaries. It is also located within the Central Basin of Myanmar. The major drainage of Sagaing is the Ayeyarwady River. The total population of Sagaing was (78,338) persons in 2018. Population density of Sagaing was 6212 persons per square mile. Of the (23) wards, Moezar ward was the most-densely populated one and Padamyar ward was the least-densely populated.

Spatial distribution of silk weaving Industry in Sagaing is analyzed by Cluster and Outlier Method; Spatial Moran (I). In studying the spatial variation of silk weaving industry, Seingone ward is the largest silk weaving industry. The least silk weaving industries are found in Poetan ward. According to calculated results of Location Quotients method, it can be concluded that silk weaving industry is more developed in Seingone ward than the others. Theoretically, the early stages of development for economics have their productions and labour forces are engaged in agriculture. Later, the manufacturing and service sectors become larger. According to finding and result, it is found that secondary economic activities, especially silk weaving industry, become larger in Sagaing. As people take on specialized economic functions like silk weaving industry, the scale of production increases and the output per person also rise in Sagaing.

Suggestions

The problems faced in the silk weaving industry are the shortage of raw materials and late delivery of the raw materials. These cause the declination of silk weaving industry in Sagaing.

If it is ordering sufficient raw materials and planning projects for the raw materials with the development of local economy, more opportunities could be created.

The finished products produced from silk weaving industry are distributed to the whole Myanmar via markets such as markets in Yangon, Mandalay, Amarapura and so on. So, costs for silk weaving industry are high. It is gap of saving for the economic development of Sagaing.

Future prospect

To analyze the development for pattern of silk weaving industry in the study area, past and present situations of these industries must be traced. For any type of economic activity including weaving industry, there is a statement that "Today's profit is tomorrow capital". It is an important idea for the investors in silk weaving industry because tomorrow is the nearest future of today and thus all the situations of today can give the foundation for its future tomorrows.

Among the traditional handicrafts found in Sagaing, silk weaving industry ranks third in position for the local economy. Moreover, the development of silk weaving industry in the city can render it to many prosperous opportunities.

In summing up, with possessing human resources such skilled Labors, locating near Mandalay City, Sagaing will reach its goal on all round development region of with the development of silk weaving industry.

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References

1. Bradford & Kent W.A. (1980) **Human Geography**, Theories and their Application, science in Geography 5, Oxford University press, England.
2. Hall, AJ (1955) "**Hand book of Textile Dyeing and printing**," The National Trade press ltd London.
3. Marlar Yu Aung, Ma (2016). **Urban Expansion of Sagaing** (A case study of Direction and Distance) University of Sagaing.
4. Terry, G Jordan (1994). **The Human Mosaic: A Thematic Introduction to Geography**, 6th Edition, U.S.A.
5. Than Than Aye. Ma (1997) "**Textile Industry of Mandalay Division**," A Thesis submitted to the board of examiners in Geography, University of Mandalay.