

Internal Assessment HL and SL

Set 2

To what extent does the CBD of Tequisquiapan, follows the traditional theory of the main characteristics in a CBD.

Subject Group: Group 3 Geography

Internal Assessment

Word Count: 2489

Fieldwork Research Question and Geographic Content 3

GEOGRAPHICAL LOCATION 5

METHODS OF INVESTIGATION 6

C. QUALITY AND TREATMENT OF
INFORMATION COLLECTED AND D.
WRITTEN ANALYSIS 9

CONCLUSION 21

EVALUATION 22

Fieldwork Research Question and Geographic Content

Tequisquiapan is a small town and a municipality located in the Southwest of the state of Queretaro in Mexico. Tequisquiapan is considered a 'Pueblo Magico', this means that the national tourism organisation has examined the town and is considered to have great cultural richness.

In order to derive to the question that will be stated below, we have been using the IB Geography syllabus. Specifically at the section in paper 2, option G, which is about urban environments. Within this unit and topic, I will focus in the central business model mainly (CBD). A traditional CBD is known for being a place where there are some characteristics such as: having many high buildings, being a densely populated area, no housing, containing high levels of pollution such as carbon dioxide, waste and noise, having a lot of traffic (both vehicular and pedestrian), having few or no housing and finally being a place of commerce.

To what extent does the CBD of Tequisquiapan, Mexico follows the traditional theory of the main characteristics in a CBD.

In order answer the research question, there must be a theory taken to evaluate Tequisquiapan against a traditional CBD. I will use the Bid Rent Theory.

Bid Rent Theory²

A reliable way to measure if the Tequisquiapan CBD follows the characteristics of a traditional CBD is with the Bid Rent Theory. According to this theory, the greater the distance from the CBD, there will be an increase in housing and a decrease in retail. Hence, the smaller the distance from the CBD the opposite to what has previously been stated will occur.

The CBD should also be the centre of consumption, wealth and production.

Tequisquiapan's CBD is expected to follow the theory once used and tested the land use survey.

Tequisquiapan has a central plaza, which is the CBD; however there is a main road in the East adjacent of the town. This could lead to potential alteration of my results. Besides that observation, there are no more anomalies to report. Therefore Tequisquiapan should follow the theory of distribution previously stated.

Hypothesis:

1. "The CBD has specialist shops clustered together."
2. "The CBD has the highest number and concentration of pedestrians."
3. "The CBD has the highest land values in the city."

² Oxfordreference.com. Bid-rent theory - Oxford Reference. 2015. Available at: <http://www.oxfordreference.com/view/10.1093/oi/authority.20110803095504805>. Accessed October 23, 2014.

Geographical Location

As shown in Figure 1 (below), we can see the location of Tequisquiapan in relation to Mexico and Queretaro. The

shaded area in red represents the state Queretaro, and inside the state we can see a darker dot, which represents the town Tequisquiapan.

As we can see, Tequisquiapan is located in central Mexico and is landlocked, meaning it is enclosed by land only.



Figure 1³

Tequisquiapan is shown in Figure 2 (right). The red mark is showing the CBD's location.



Figure 2⁴

³ Conocetequisquiapan.blogspot.mx. Tequisquiapan. 2015. Available at: <http://conocetequisquiapan.blogspot.mx/>. Accessed November 20, 2014.

⁴ Google.com.mx. Independencia, - Google Maps. 2015. Available at: <https://www.google.com.mx/maps/place/Independencia,>. Accessed November 21, 2014.

Methods of Investigation

1 Method – Nearest neighbour

We decided to see the distance between shops. To find the distance between each shop I stood up in front of the shop and by using bare eye, I looked for the nearest neighbour. After identifying the closest shop, I headed towards the entrance of the nearest shop and counted steps. Since 89 of my steps are 100 metres, I divided 100 by 89 and then multiplied the value times the number of steps it took me to travel from one shop to the next one.

I did this because this method tells us that the shops will be, theoretically clustered, according to the traditional CBD theory. I would expect the nearest neighbour to tell me whether Tequisquiapan has clustered shops.

Rn= Rate of nearest neighbour value

D(Obs)= mean observed nearest neighbour

a= area under study

n= number of point

Figure 3⁵

$$R_n = \frac{\bar{D}(\text{Obs})}{0.5 \sqrt{\frac{a}{n}}}$$

⁵Geographyfieldwork.com. Nearest Neighbour Analysis. 2015. Available at: http://geographyfieldwork.com/nearest_neighbour_analysis.htm. Accessed December 4, 2014.

In order to obtain the nearest calculation, specific types of stores were used.

As my results are expected to suggest, Tequisquiapan follows the traditional CBD model in terms of nearest neighbour. This is like this since it is evident that the area is clustered in terms of stores, to give customers the possibility to easily compare their goods and be able to attract more customers.

Method - Pedestrian count

I decided to count the number of people, which passed over an area over a certain time. I got the values by standing next to the wall and counting the number of people who passed in front of me over 2 minutes. After recording the value I walked 100 meters away from the centre of the CBD and repeated the process. I did this because it would be able to describe if the area is densely populated. According to the traditional CBD model I would expect to see and count less people the further away I get from Tequisquiapan's CBD.

Method – Land Value

To find the land use of Tequisquiapan we divided the class into 4 groups of 2 people, each group would go to an area in the CBD. All together we would walk every street in the CBD and mark the location of each shop in the map with two numbers. The number would represent the price per land as well as their area, we would obtain this number by asking the employees the number of squared meters their land had and approximately the price per meter squared they considered accurate for their business' area. Additionally, we would visit real-estate houses to get the official prices per meter squared in the CBD and its close surroundings. I did this because it would tell me if the price of land was going to decrease the further away from the CBD. Furthermore, it would show me if land's area would increase the further away you get from the CBD. Therefore, if my results followed this pattern, I would be able to identify that Tequisquiapan follows the traditional structure of a CBD.

C. Quality and Treatment of Information Collected and D. Written Analysis

1 Method – Nearest neighbour

Figure 4

| Points | Distance (m) |
|--------|--------------|
| 1-2 | 24.70 |
| 2-3 | 13.50 |
| 3-4 | 33.70 |
| 4-5 | 10.10 |
| 5-6 | 94.40 |
| 6-7 | 3.40 |
| 7-8 | 11.20 |
| 8-9 | 94.40 |
| 9-10 | 9.00' |
| 10-11 | 16.90 |
| 11-12 | 33.70 |
| 12-13 | 24.70 |
| 13-14 | 16.40 |
| 14-15 | 7.90 |

Figure 5

| Points | Distance(m) |
|--------|-------------|
| 0-A | 89.90 |
| A-B | 89.90 |
| B-C | 44.90 |
| C-D | 46.10 |
| D-E | 57.30 |
| E-F | 19.10 |
| G-H | 53.40 |
| H-I | 53.90 |
| I-J | 5.60 |
| J-K | 48.30 |
| K-L | 5.60 |
| L-M | 10.10 |
| M-N | 5.60 |
| N-O | 8.98 |

In order to obtain the nearest calculation, specific types of stores were used. I personally used technology stores and got as a result $R_n = 0.61$, which means the area is clustered since the value is less than one. Hence, following the traditional CBD theory.

As my results suggest, Tequisquiapan follows the traditional CBD model in terms of nearest neighbour. This is like this since it is evident that the area is clustered in terms of stores, to give customers the possibility to easily compare their goods and be able to attract more customers. In addition, by simply looking at the land use map we can identify that most of the stores in the town are located near the CBD.

There are anomalies though. As we can see in points 1-2, the distance is 24.70m, meanwhile at points 14-14 the distance is 7.90m. Meaning that despite being further away from the CBD points some shops are still closer; the reason for this might be that shops want to be close to each other and not necessary close to the

CBD, creating their own "specialized shop area" with lower rent prices.

Furthermore, tourists usually go to the CBD/plaza for the historical and cultural value at times, not for shops.

Nearest Neighbour Analysis formula:

$$Rn = \frac{D(Obs)}{0.5\sqrt{\frac{a}{n}}}$$

Figure 6

Nearest Neighbour Analysis

Urban Landuse Classification

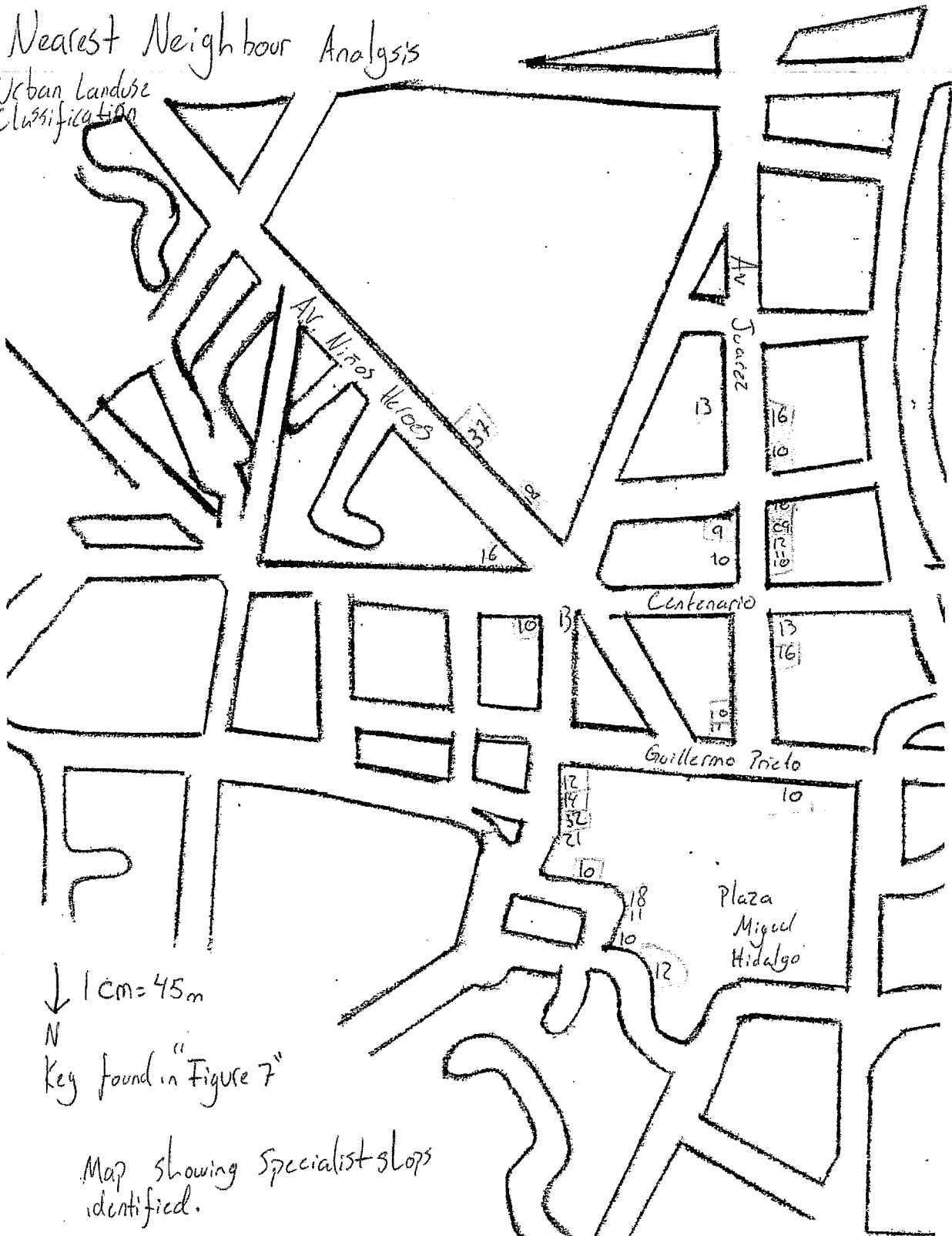


Figure 7

Urban Landuse Classification

| | |
|---|-----------------------------|
| 0 | CONVENIENCE GOODS |
| 1 | SPECIALIST/COMPARISON GOODS |
| 2 | LEGAL/FINANCIAL SERVICES |
| 3 | GENERAL SERVICES |
| 4 | HOTELS/ENTERTAINMENT |
| 5 | AUTO SALES |
| 6 | EDUCATION/HEALTH/RELIGION |
| 7 | OTHER |
| H | HOUSE |
| X | UNKNOWN/X FACTOR |

These categories can be further divided;

| | |
|---------------------|----------------------|
| 0 CONVENIENCE GOODS | |
| 01 | Food only |
| 02 | Food and other items |
| 03 | Bakery |
| 04 | Chemist |
| 05 | Beers/wines etc. |
| 06 | Butchers |
| 07 | Hardware/paint |
| 08 | Paper/stationary |
| 09 | sweets |

| | |
|-------------------------------|-------------------------------|
| 1 SPECIALIST/COMPARISON GOODS | |
| 10 | Clothes |
| 11 | Shoes |
| 12 | Jewelry |
| 13 | Souvenirs/handicrafts/pottery |
| 14 | Furniture |
| 15 | Books/music |
| 16 | Radio/tv/electrical/vido |
| 17 | Photographic |
| 18 | Plants/flowers |
| 19 | Pet shop |
| 19a | Antiques/art |
| 19b | Sports goods |
| 19c | Haberdashery (merceria) |
| 19d | Toys |
| 19e | opticians |

| | |
|-------------------|--------------------------------|
| 2 LEGAL/FINANCIAL | |
| 20 | Bank |
| 21 | Government |
| 22 | Offices |
| 23 | Lawyers/notaria/registro civil |
| 24 | Police station |

| | |
|--------------------|-----------------------------|
| 3 GENERAL SERVICES | |
| 30 | Travel agent/money exchange |
| 31 | Hairdresser/beauty salon |
| 32 | Post office/telegraph |
| 33 | Shoe repair |
| 34 | Printer |
| 35 | Funeral parlour |
| 36 | Computer/copies/internet |
| 37 | Laundry |
| 38 | Parcel service |
| 39a | Keys cut |
| 39b | Glass cutting/fitting |
| 39c | market |
| 39d | Public toilet |
| 39e | Dry cleaners |
| 39f | Real estate |

| | |
|-----------------------|-----------------------------|
| 4 HOTEL/ENTERTAINMENT | |
| 40 | Hotel |
| 41 | Restaurant/café/coffee shop |
| 42 | Bar |
| 43 | Cinema |
| 44 | Pool/billiards |
| 45 | Ice cream |
| 46 | Theatre |
| 47 | gym |

| | |
|--------------|----------------|
| 5 AUTO SALES | |
| 50 | Petrol station |
| 51 | Mechanic |
| 52 | Auto parts |
| 53 | Tyre repair |
| 54 | Bicycle repair |
| 55 | Machine repair |

| | |
|-----------------------------|---------------------------------|
| 6 EDUCATION/HEALTH/RELIGION | |
| 60 | Primary/kinder |
| 61 | Secondary/high school |
| 62 | Tertiary education e.g. college |
| 63 | Dentist |
| 64 | Doctor |
| 65 | Church |
| 66 | Library |
| 67 | Museum |
| 68 | Hospital/clinic |
| 69 | Orphanage |
| 69a | Alcoholics anonymous |
| 69b | Vet |

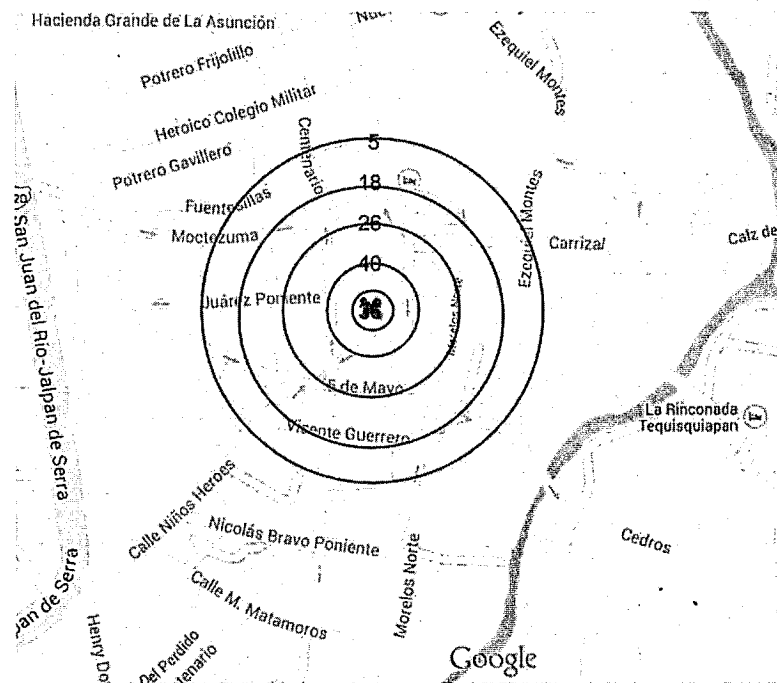
| | |
|---------|------------------------------|
| 7 OTHER | |
| 70 | Factory |
| 71 | Builders supplies |
| 72 | Warehouse |
| 73 | Carpenter |
| 74 | Agricultural supplies |
| 75 | Vacant lot |
| 76 | Car park |
| 77 | Fire station |
| 78 | Park |
| 79 | Basketball court |
| H | Residential e.g. house, flat |
| X1 | |
| X2 | |
| X3 | |
| X4 | |

2 Method - Pedestrian count

As I counted the number of pedestrians walking through the road I was standing in, I collected the data. As a result I got this map.

| Distance from CBD in North direction(m) | 0 | 100 | 200 | 300 | 400 |
|---|----|-----|-----|-----|-----|
| Pedestrian count | 36 | 40 | 26 | 18 | 5 |

Figure 8⁶



⁶ Google.com.mx. Plaza Principal, La Magdalena, 76750 Tequisquiapan, Qro - Google Maps. 2015. Available at: <https://www.google.com.mx/maps/place/Plaza+Principal,+La+Magdalena,+76750+Tequisquiapan,+Qro./@20.5243168,-99.8814751,722m/data=!3m2!1e3!4b1!4m2!3m1!1s0x85d39e0a9b313595:0xbcdc412fcc056cfa?hl=en>. Accessed December 12, 2014.

As we can see the pedestrian count seems to be almost as an Isoline map. The further you get away the number of pedestrian count reduces almost in a proportional way to the distance. For example in the radius 100m from the CBD, we can see that there are 40 pedestrians. Once we go to the next counter line, which is about 200m from the CBD we can see how the number of pedestrians fall dramatically to 18.

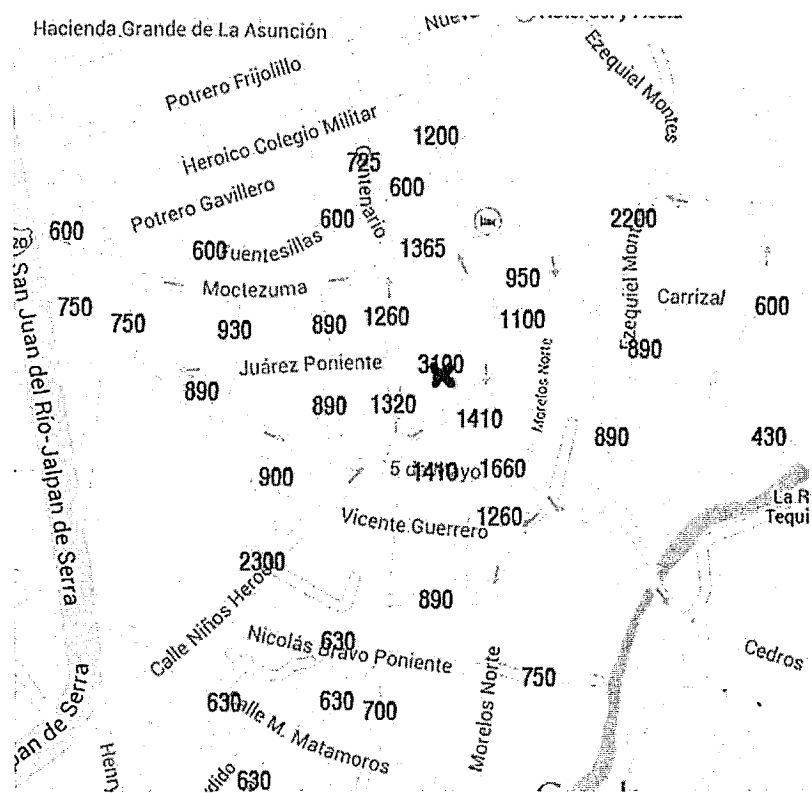
The CBD of Tequisquiapan seems to follow the traditional structure of a CBD according to the pedestrian count; however, there are some anomalies. For example we can see that at second counter line the number of pedestrians increased, despite the fact the greater from the CBD is greater. This could have meant there was a mayor retail shop that somehow attracted a vast number of people. As I realised this was altering my results I decided to go back and check what was it that was affecting my results.

As I reached the area, it immediately stand out the building that was attracting people. This building was a governmental building. In this building people would go to get their official identifications, driving license, building permits and any legal documentation, This is the only place where they can do this within approximately 50 km. Therefore, it is understandable that many people will go there and hence pass through the place where I was standing counting people. Besides this anomaly though, my results seem to fit in the pattern pretty well.

3 Method – Land value

While exploring the bid rent theory and the map we developed, it is quite evident that the further away you get from the Plaza 'San Miguel', in any direction (North, South, West and East), the price per meter was decreasing almost proportionally.

Figure 9⁷

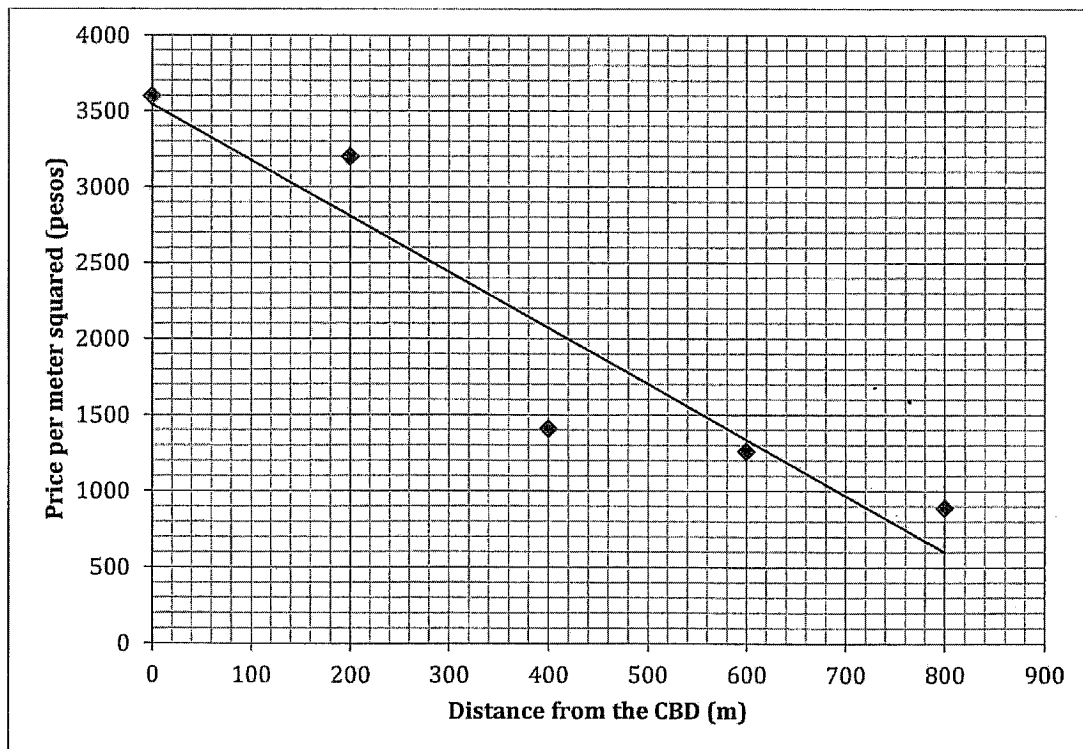


⁷ Google.com.mx. Plaza Principal, La Magdalena, 76750 Tequisquiapan, Qro - Google Maps. 2015. Available at: <https://www.google.com.mx/maps/place/Plaza+Principal,+La+Magdalena,+76750+Tequisquiapan,+Qro./@20.5243168,-99.8814751,722m/data=!3m2!1e3!4b1!4m2!3m1!1s0x85d39e0a9b313595:0xbcdc412fcc056cfa?hl=en>. Accessed December 12, 2014.

The trend suggesting that the further away from the CBD, the lower the land value; however, we can see that there are some few anomalies where the price for one meter squared is about 1,200 and 2,200 pesos despite being a larger distance away from the CBD. There can be some reasons for this: Firstly, there were some elite residential areas where there was a gulf club, which made the price higher. Secondly, the land seemed to be better on these areas – the land was flatter and the soil was more solid and it did not have quarry, meaning that building there would be cheaper and less complicated as well as time consuming.

| | | | | | |
|-----------------------|------|------|------|------|-----|
| Distance from CBD (m) | 0 | 200 | 400 | 600 | 800 |
| Price per m2 | 3600 | 3200 | 1410 | 1260 | 890 |

Figure 10



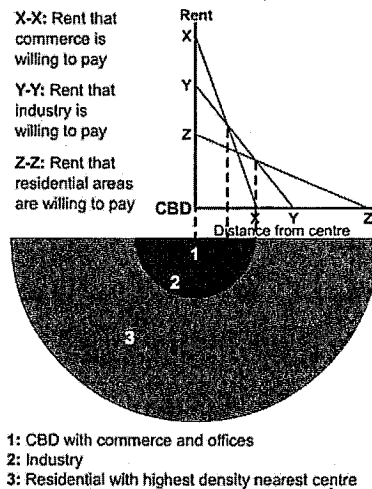
As we can see in Figure 4, there is a strong correlation between the distance from the CBD and the land value. The land value is almost inversely proportional to the distance from the CBD. Nonetheless we can see some anomalies such as at the 200 and 400 meters from the CBD, where the correlation seems to get slightly off the trend; though the only that does not follow the common trend is the 400 meters point, since the value is too low.

The graph show that the prices are higher the closer to the CBD; this s because is limited and on a high demand yet a low supply, which results in high prices for the land value. Therefore, we can se that the town of Tequisquiapan does follow the traditional structure of a CBD in terms of land value.

Furthermore, despite the fact it is less densely populated in the outskirts of the CBD of Tequisquiapan there is another reason why the prices are lower. As we kept on collecting data we could see that as we got

Figure 11⁸

further away from the CBD, the road gradient seemed to be increasing. Tequisquiapan's CBD seems to be in the centre of a couple of small hills and mountains, meaning the outskirts have steeper roads. Being in the outskirts of the CBD could be tough according to some locals, they argued that services were usually harder to obtain outside from the CBD



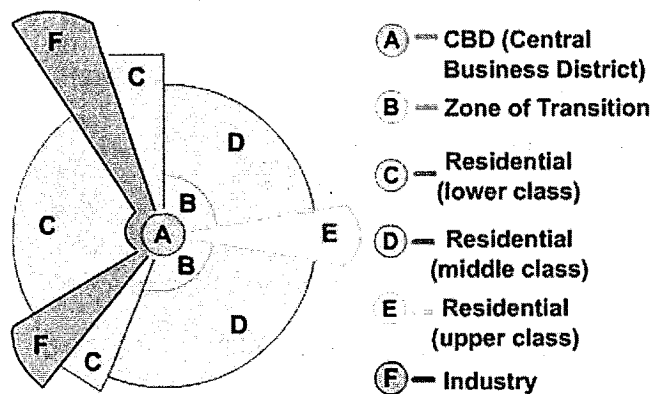
in general, due to irregular land. For example, they would spend days without electricity and water when maintenance from firms was required, and this would take twice as long as it would in the CBD. Another interesting example was that taxis had a range in the CBD, they did not go too far away from the CBD and hence did not provide their service to customers in the outskirts of the CBD. Therefore it was logical that the land value outside from the CBD is by far less desirable and as a consequence cheaper.

Moreover, Tequisquiapan's land value seems to be following the bid rent theory: retail is willing and able to pay high rents in order to be near the CBD and benefit from the densely population.

⁸ S-cool.co.uk. 2015. Available at: http://www.s-cool.co.uk/a-level/assets/learn_its/a-level/geography/urban-profiles/central-place-and-bidrent-theories/2007-10-15_160719.gif. Accessed January 7, 2015.

Meanwhile local residents live further away from the CBD and pay a lower price for a much larger area. Nonetheless, there are still some locals located outside from the CBD who seek to sell handmade products such as artisanal jewellery or souvenirs to incoming tourists travelling towards the CBD,

Even though Tequisquiapan's CBD model seems to fit the traditional structure of a CBD, there is an anomaly, as previously stated.



There can be several reasons for this anomaly; for example the ones previously mentioned: type of soil, accessibility to services, gradient of the land, elite residential areas and

security. However, there seems to be another, reasonable theory for this anomaly – The Hoyts model¹⁰. Hoyts city model suggests that there is an area of “industry” (shown in area F in Figure 10). This area is actually in contact with the CBD, perhaps when the city was initially growing, the industry developed towards an area. As a consequence some of the industry could have incusted into the CBD. This might have turned this area into a low-class zone, making the area look

⁹ S-cool.co.uk. 2015. Available at: http://www.s-cool.co.uk/a-level/assets/learn_its/a-level/geography/urban-profiles/models-from-burgess-and-hoyt/2007-10-15_162158.gif. Accessed January 7, 2015.

¹⁰ Guinness P. Patterns And Change. Cambridge [u.a.]: Cambridge Univ. Press; 2011.

visually undesirable and not touristic. Hence, leading the land value to fall in that area. Due to the closeness to the CBD, prices are still slightly higher though.

Overall, Tequisquiapan indeed follows the traditional structure of a CBD. The land value test, the pedestrian count test and the nearest neighbour test; all seem to fit the traditional structure and have the typical characteristics of a CBD. Our hypothesis, investigations and analysis were proved correct. We can see this since the land value decreases the further away from the CBD, we see a lower number of pedestrians the further away from the CBD and we also see that businesses were less clustered the further away from the CBD.

Tequisquiapan's CBD is not completely perfect and it has some anomalies. A clear example would be that the number of pedestrians is not at its highest in the centre of the CBD but 100 meters away from it. Moreover land values can be random at some areas of the CBD. These examples help to arrive to the conclusion that either the CBD in Tequisquiapan does not follow completely the structure of a traditional CBD, or the methods of investigation were not carried out properly or were not relevant at some points. Some inaccuracy also occurred by the CBD itself; there were some constructions in the central plaza and as a consequence pedestrians had to take different paths and were not able to reach some shops, affecting our results.

Conclusion

Through the methods of investigation: pedestrian count, land value and nearest neighbour – I can conclude that Tequisquiapan CBD, follows the structure of a traditional CBD. I state this because through the analysis and investigation, the hypotheses initially stated were proven correct; the land value decreases the almost proportional to distance from the CBD, there are clustered specialist shops near the CBD and the number of pedestrians increases the shorter the distance from the CBD. Nonetheless, there are some anomalies. For example at some points further away from the CBD there were times where the number of pedestrians was higher, the land value was higher too, as well as the density of specialist shops. Therefore it would be incorrect to state that Tequisquiapan's CBD follows perfectly the characteristics of a CBD; however, it is acceptable to blame the inaccuracy of the results and the methodology for the inability to state that Tequisquiapan CBD's has no anomalies.

It is also important to highlight that Tequisquiapan is in a LEDC (Mexico) and thus, the traditional structure of a CBD should not fit Tequisquiapan completely as it was a theory for a MEDC city (Chicago).

Evaluation

If I could carry out this investigation again, in order to obtain more accurate raw data and therefore more solid conclusions, as a result answering the research question with more precision. I could go back to Tequisquiapan to take results it would be better to go when there are not many mayor constructions to avoid receiving misleading data such as the pedestrian count – people were limited to few roads to enter the CBD. Tequisquiapan's CBD was divided into 4 different areas where a group of 2 or 3 people would take data from; this lead to some inaccuracy in the results as different students obtained their data with slightly different methods. Therefore, it would have been better if one student obtained all the data and then shared it with everyone to have more reliable results.

Taking data on a weekend would have made the results more accurate as there would have been more people in the CBD and thus, we would have more numbers which would lower chances of anomalies. Finally, as stated before, Tequisquiapan is in a LEDC. Hence it would have been appropriate to investigate something different by having a different research question such as: Identify the limits of the CBD area in Tequisquiapan.

Bibliography

- Guinness P. Patterns And Change. Cambridge [u.a.]: Cambridge Univ. Press; 2011.
- http://www.s-cool.co.uk/a-level/assets/learn_its/alevel/geography/urban-profiles/models-from-burgess-and-hoyt/2007-10-15_162158.gif.
- http://www.s-cool.co.uk/a-level/assets/learn_its/alevel/geography/urban-profiles/central-place-and-bidrent-theories/2007-10-15_160719.gif.
- <https://www.google.com.mx/maps/place/Plaza+Principal,+La+Magdalena,+76750+Tequisquiapan,+Qro./@20.5243168,->
- <http://conocetequisquiapan.blogspot.mx/>.
- http://geographyfieldwork.com/nearest_neighbour_analysis.htm
- <http://www.oxfordreference.com/view/10.1093/oi/authority.20110803095504805>

Geography 2019 Internal Assessment – Samples A to D commentary

| Sample C | Criterion | Marks allocated out of 25 | Marks Awarded |
|---|-----------|------------------------------|---------------|
| <p>The title of the syllabus unit is slightly different as it corresponds to the old guide (page 3 of the work)</p> | | | |
| <p>Fieldwork question and geographic context</p> <p>The question is geographical and focused. It identifies the specific location of Queretaro. It allows for data collection and it is explicitly linked to the urban environment topic including the use of geographical theory (although it could have been better supported by including graphs and diagrams. The maps do not really follow mapping conventions but the best-fit band is the 3 points one as it is the one that reflects more descriptors.</p> | A | 3 | 3 |
| <p>Method(s) of investigation</p> <p>The methods are described and allow for enough data to be collected and they are linked to the question. Also statistical tests are described although there are no explicit references to sampling, they are implicit by statements like "the whole area was surveyed" (page 8). Nevertheless, it is not clear how the actual data collection took place, division of groups, organisation of the tasks, etc. A best fit boundary again.</p> | B | 3 | 2 |
| <p>Quality and treatment of information collected</p> <p>The information is relevant to the question and there is some good use of statistics (NNA), and acceptable maps that could have been better developed as actual isolines or proportional symbols for example. Nevertheless the land use tables in the middle of the text do not make much sense. The conventions are not always followed. Best fit 3-4</p> | C | 6 | 4 |
| <p>Written analysis</p> <p>The analysis covers all the areas of research and makes good use of the theory and with clear links to the question. Nevertheless there are several points out of context that come from data and</p> | D | 8 | 6 |

| | | | |
|--|---|----|----|
| information that have not been presented, such as the point about the taxis on page 18. There is a basic attempt at explaining anomalies and sometimes even forced in links with the theoretical background that are not always naturally established, such as the example of the Hoyt's model on page 19. | | | |
| Conclusion Conclusion is adequate and presents evidence directly in line with the analysis. | E | 2 | 2 |
| Evaluation Methods are evaluated acceptably well with simplistic recommendations for improvement. | F | 3 | 2 |
| Total | | 25 | 19 |