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Article

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Journal of Global Entrepreneurship Research

Provided in Cooperation with:

Springer Nature

Suggested Citation: Rahman, S. M. Towhidur; Kabir, Ahsanul (2019) : Factors influencing location choice and cluster pattern of manufacturing small and medium enterprises in cities: Evidence from Khulna City of Bangladesh, Journal of Global Entrepreneurship Research, ISSN 2251-7316, Springer, Heidelberg, Vol. 9, Iss. 61, pp. 1-26,
<https://doi.org/10.1186/s40497-019-0187-x>

This Version is available at:

<https://hdl.handle.net/10419/261989>

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Factors influencing location choice and cluster pattern of manufacturing small and medium enterprises in cities: evidence from Khulna City of Bangladesh

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Abstract

This study aims to identify the location and cluster pattern of manufacturing SMEs in Khulna City and the reasons behind such pattern since localisation of SMEs has significant impact on the economic development of cities and regions. A walking survey was conducted to identify the SME location pattern and a semi-structured personal interview was conducted to collect data from manufacturing SME entrepreneurs to find why such patterns exist. A cross section qualitative multiple case study design and pattern matching technique was applied to answer the research questions. The finding of the study shows SME location choice was influenced by a combination of location specific, personal, and community factors whereby personal factors are prioritised over other factors in location selection. While the cluster formation or localisation of SMEs depends on only location-specific factors. The study findings are expected to contribute in urban planning and regional development through providing useful insights relating allocation of spaces for industry development.

Keywords: SME, Location theory, Cluster, Manufacturing industry, Personal factor, Bangladesh

Introduction

It is well accepted in literatures that small and medium enterprises (SMEs) play significant role in the socio-economic development of a region and a country. It is empirically tested that economic landscape of developing countries is dominated by SMEs and they are called nucleus of economic activities for their contribution to output and employment. SMEs constitute the industrial base of many developing and developed nations. Governments and researchers in many countries consider industrialisation as a panacea for economic growth (Wong and Yip, 1999). Although studies addressing the impact of industrialisation on economic growth suggest inconclusive results, government of some developing countries put high emphasis on industrialisation for accelerating faster economic growth.

Historically the degree of industrialisation is heterogeneous across the world both in regions and locations. Sridhar and Wan (2010) asserted an interesting link between

industrialisation, urbanisation, and economic growth from the analysis of GDP contribution of cities to the national economy of several countries including Brazil, India, and China. They argued that localisation of industries in cities influences cities' ability to become engines of economic growth. The greater the level of urbanisation, the greater the contribution of cities are observed to the GDP and thus in economic growth. Thus urbanisation has a positive impact on economic growth (Nguyen and Nguyen, 2018). Researchers (Zhou and Liu, [n.d.](#); Adhitama et al., 2018) also argued that SMEs are the main force to promote urbanisation. In other way round, it is postulated that SMEs tend to localise in cities as they can efficiently access various business facilities and infrastructures (Dutta, 2002). Thus, localisation of SMEs has significant impact on the economic development of cities and regions. Different development indicators like employment levels, regional income levels, and growth rate are heavily dependent on the location and investment choices of firms. So location decision of SMEs and other firms has been a crucial aspect of political-administrative planning for a considerable time now, in different western economies (Assink and Groenendijk, 2009).

Location is crucial among many other factors that influence success of industries. Therefore, study of location choice of industries is a significant aspect of economic geography, regional planning, and development. Large number of theories had been developed over the last century about industrial location. These location theories as a central component of economic geography tried to explain patterns of location of industries and predict suitable location for industries to locate. Yet no single theory is sufficient to explain why and how individual firms select location and industries cluster in a region (Jones and Woods, 2002). This implies that the location decision of firms is often context specific and the complexity of such decisions is often influenced by various behavioural, social, and locational characteristics. Martyniuk-Peczek et al. (2017) claimed that existing location theories and empirical studies do not focus on size difference of firms which certainly has impact on location decision and SMEs are often ignored from such studies. Very few researches could be found explaining location behaviour of SMEs especially in the context of Bangladesh. Thus, more researches need to be conducted to better explain the location choice and cluster pattern of SMEs. Such researches are expected to assist governments and policymakers to diagnose locational needs of such SMEs and formulate appropriate strategies for their development. Considering the significance of SMEs in process of industrialisation, urbanisation, and economic growth, this study aims to explore the factors influencing location choice and clustering pattern of manufacturing SMEs in Khulna City. Materialising this aim requires identifying the major category of manufacturing SMEs, their geographic locations, and reasons behind such location patterns in the context of Khulna City.

The paper is structured in five sections. A short review of the prevailing theories and factors relating the industry location choice follows this introduction. The '[Methods](#)' section presents the methodology. The '[Results](#)' section presents the empirical findings. Finally, follows the discussion and conclusion.

Literature review and propositions

Location choice of industries, in particular manufacturing industries, is considered as a crucial topic of research for economic geographers for nearly a century. It also received attention of economists, urban planners, and policymakers as firm locations have

impact on different development indicators of a region. Thus, location theories had become a central component of economic geography. Location theories explain how economic and human activity relate to geographical space and attempt to identify factors influencing location decision of individual firm and emerging location pattern of industries under specific context. Survey of general location theories developed over the last century indicates two distinctive classes—(neo-) classical or economic theories and behavioural theories. The classical theories are based on the assumptions of ‘economic man’ and ‘isotropic space’ and the main focus of these theories on cost minimisation. These theories hold that entrepreneurs have complete information about decision parameters and act rationally based on cost benefit analysis in choosing location and there is no variation in geographical spaces (Weber, 1929; Predöhl, 1928). The neoclassical theories differ from classical theories in that these supplement the assumptions with the idea of market competition, revenue, internal economies of scale, effect of varying combinations of production factors, and focused on profit maximisation (Hotelling, 1929; Lösch, 1954; Hoover, 1948; Isard, 1949; Smith, 1966). On the other hand, behavioural paradigm considered location choice as a part of strategic investment decision which is influenced by multiple factors in addition to cost of production and profit. It also assumed that entrepreneurs are boundedly rational and tend to suffice rather than optimise or maximise. That means there is always a chance that an individual can make a conscious location decision not to maximise profit when other goals such as growth, risk minimisation, merely self-survival get priority (Pred, 1967). Concepts like spatial cognition, mental maps, and regional images of entrepreneurs form the core of these behavioural theories (van Noort and Reijmer, 1999).

A recent paradigm of location analysis often termed as new economic geography (Krugman, 1991; Gatfield and Yang, 2006) argues that the flexible production structure results in extended social division of labour and generates many specialised sub-sectors. This process consequently engenders progressive externalisation of production structure through network of processes and firms which again leads to locational convergence. Incorporating transaction cost as spatial logic for agglomeration, this thesis views firm as network of internal and external linkages and every linkage incurs transaction costs. Since this cost is a function of linkage length, the greater the distance over which the linkage occurs, the greater would be the cost. The increased cost associated with greater external transactions acts as a ‘spatial pull’ for the firms to cluster around shorter distance to gain economies (Scott, 1988; Henry, 1992). Such agglomerations further invigorate the process of re-agglomeration as firms can benefit from lower transaction cost, growth of specialised labour market, and diffusion of knowledge as observed by Alfred Marshall (1920) in industrial districts. This theory gives a new direction towards location decision of firms especially it explains how economic structural change can lead to agglomeration and associated geographic pattern of industrialisation.

Another stream of research relating to industrial location attempted to find out location factors important in the decision-making process of modern industry. These location factors are the result of accumulation of theoretical concepts and findings of industry-specific independent studies done over many years. These factors are classified in different ways in different literatures so as the numbers; definition and the importance of factors affecting location vary from one business and industry to another (van Noort and Reijmer, 1999; Jones and Woods, 2002). Moreover, the effects of these factors are also found to

vary within the same industry due to change in technology, economic condition, and time. These factors are interdependent and can be attained at different degrees at different locations and so subjective judgments and attitudes of entrepreneurs become important factors in the location decision-making (Jones and Woods, 2002). Dicken and Lloyd (1990) classified location factors as internal factors (e.g. management, ownership structure, goals of organisations), location factors (e.g. access to customers and suppliers, size of the space etc.), and external factors (e.g. natural and regulatory conditions) while van Noort and Reijmer (1999) categorised these factors as pull factors (which drive industries towards a location, e.g. market access), push factors (which forces industries to relocate to a new location, e.g. unfavourable legislation), and keep factors (which influence industry to remain in the current location, e.g. human resource inertia). Again these factors can be grouped as 'hard factors' which include production space, market proximity, and transports which are measurable in terms of cost and secondly 'softly factors' quality of life, attitude of community etc. which are immeasurable in terms of cost and relate to subjective judgment (Martyniuk-Peczek et al. 2017). Another classification by Vaillant et al. (2012) includes infrastructure and economic motivation, personal motivation, and location-related motivations.

Location factors that are found to be important from the theories and empirical researches often include raw materials, transportation, markets, labour, capital, water, industrial energy, and community factors (Renner, 1947; Rawstron, 1958, Djwa, 1960). Historically raw materials, transportation, and industrial energy are considered as important location factors for industries. But due to improvement in transportation system, the significance of these factors as locative factors had declined in modern economy. Locating near the source of raw materials is important for industries processing perishable and weight losing materials and where cost of raw materials is a significant proportion in the total value of product (Renner, 1947). Plants should not consider transportation just from cost consideration rather should prioritise quantity and reliability of transportation over cost minimisation while making selection decision (Jones and Woods, 2002). Market as a location factor gained importance over time. It is especially significant for industries producing weight gaining products or products that need speedy delivery or perishable products and require close contact with the customers (Renner, 1947). It is often helpful to distinguish between consumer market and industrial market while making location decision (Jones and Woods, 2002). Firms producing consumer products tend to locate in cities or regions with larger population whereas industrial goods producers will locate near to industries having special need for that product. Labour is considered as the most complicated among the primary location factor (Djwa, 1960). The author also noted that a number of issues like wage rate, productivity, skill, turnover, supply, and labour laws complicate the labour-oriented location decisions. Importance of labour also found to vary among industries. Labour in a location also forms the market and thus has critical interrelation between these two factors. Firms often tend to locate to a point which offers essential amenities for the labour. Access to required supply of water, capital, and energy (fuel, electricity etc.) attracts industries to a location. The significance of locating to energy source had declined with the advancement in technology that enhanced the efficiency of machines and improved the transportation and transmission of energy. Community factors indicate the attitude of government, public, and labour. Favourable attitude towards

industrialisation of the community member is essential for establishing an industry. Favourable attitude of government is often reflected through labour legislation, taxation policy, sanitary, and protective services in a location.

van Noort and Reijmer (1999) discussed location factors from a different angle and argued that location decision is determined by business characteristics, business environment, and external trends and developments. The importance of location factors varies in different industries according to their characteristics and environment where they operate. Business trends like increasing environmental legislation, increased role of human capital in decision-making, development of business clusters, or inter-firm networking also have significant influence on location choice. So the first proposition of this study is as follows:

Proposition 1: Location selection is a strategic decision of entrepreneurs which are influenced by a combination of location specific, personal, and community factors.

In last two decades, academicians and policymakers had shown immense interest in the concept of regional industry clusters. A large body of literature can be found on this concept which mainly discusses about the structures and characteristics of functioning clusters, their importance and advantages, and also policy support for their development in a region. But quite a less number of studies focused on the evolution of a cluster and thus formed a recent paradigm of research intended to explore why and where clusters emerge and grow. Yamawaki (2002) found a number of factors independently or in combination contributing to the emergence of clusters including historical circumstances, existence of a large manufacturing unit, prior existing supporting related industries like universities, RandD institutions etc., pre-existence of related industry cluster in neighbouring region, reduction in transportation costs due to infrastructure improvement, technology transfers from other clusters and foreign countries, and conducive regional government policy. This finding was consistent with the findings of other scholars (Porter, 1998 and Krugman, 1991) where they pointed out historical circumstance/accidents, demand conditions, existence of one or few innovative companies, technological spillovers, availability of human capital and input supplies, and chance events as key drivers for cluster development.

Proposition 2: Conducive government policy, locational attractiveness/favourability, technology transfer and chance factor independently or in combination influence formation of cluster at a location.

The discussion in this section does not present an exhaustive list of location theories and factors. Yet the review presents a comprehensive idea about the development in the field of industrial location and cluster formation. This insight from the analysis of location theories and factors is essential to understand for not only the entrepreneurs but also policymakers and development planners since creation of an ideal fit between industry and the economic regions is one of the important objectives of many development programs. This analysis would also lay foundation for the subsequent analysis of this current study where the location pattern of manufacturing SMEs would be evaluated to understand locational strength and weaknesses of that region which would provide useful insights for future development planning.

Methods

This study had been conducted in two phases: in the first phase, major manufacturing SMEs in Khulna City and their location pattern were identified and in the second

phase, reason behind such pattern was explored. In the first phase, the study adopted the definition of Bangladesh Bank (2015) (see [Appendix](#), Table 2) and the SME typology developed by SME Foundation (SMEF, 2013) in designing a tally sheet to identify the major manufacturing SMEs and their locations. Seven categories of manufacturing SMEs were included in the tally sheet and manufacturing SMEs beyond these categories were included as separate category 'Others'. A city-wide walking survey was conducted on the major roads of the city to locate the manufacturing SMEs, put tally marks, and note location description (e.g. holding number or identifiable landmarks) on separate tally sheet assigned for each road or location. In addition to this, snowballing technique was applied whereby the entrepreneurs of manufacturing units were asked to identify locations of other similar firms. This approach was felt logical since there was no reliable data from any registering authority or industry associations on the numbers and location of manufacturing SMEs in the city area and the conventional wisdom suggests that entrepreneurs usually have information about their competitors and their locations. Then the data were plotted on map of Khulna City Corporation applying GIS mapping tools to indicate location or cluster formation pattern. Five categories of manufacturing SMEs were identified in Khulna City as the major sectors in terms of number of firms. This survey was conducted between February, 2018 and June, 2018. The optimised hot spot analysis tool was applied to locate the potential cluster regions for manufacturing SMEs across 31 wards (smallest administrative unit) of the city. This tool is used to locate statistically significant hot spots (spatially clustered high values) and cold spots (clustering of low values) of incident data (points representing manufacturing SMEs). It generated maps of statistically significant hot spots for different categories of SMEs using Getis-Ord G_i^* Statistic based on the given incident data and polygon features (ward boundaries) applying Fishnet aggregation method (ESRI, 2018). These spatial analyses were performed using ArcGIS 10.5.

The second phase started after identifying the location pattern of SME manufacturing sector. Qualitative multiple case study design was applied in this phase to identify why such location pattern exists. Case study method is suitable when the study addresses 'why' and 'how' questions; the researcher has little or no control over events, and the focus of the study is on a contemporary phenomenon within some real-life context (Yin, 2014). A semi-structured questionnaire was used to interview 15 entrepreneurs (as cases). The entrepreneurs were selected using purposive sampling technique. The entrepreneurs were selected in a way that they are taken from all the five major categories and their major clusters. Due to fear and reluctance of the entrepreneurs in participating interview, referrals of bank personnel working in SME loan sections of couple of banks were used to get appointment and introduced with the entrepreneurs. Thus, chance of personal bias related to convenience sampling technique was reduced. Only founder entrepreneurs, those who made the location decision, were interviewed.

Personal interviews with the entrepreneurs using a semi-structured, open-ended questionnaire at their factory premises were the main source of data. After conducting first two interviews, the questionnaire was finalised through adding few important questions revealed from those interviews and dropping the unnecessary ones. For conducting the interview, an interview protocol was developed containing some initial questions to understand the nature of the business and questions regarding the ideal location factors, location choice factors, and cluster formation. The questions were

basically included considering the research questions and based on the understanding of previous researches in the field. To get detail about the relevant issues, necessary probing (in the form of 'why' and 'how' questions) was done depending on the flow of conversation. The interviews were recorded with the permission of the interviewee and on condition of keeping data anonymous. Average duration of the interviews was 30–35 min. All the interviewees were Bangladeshi nationals and majority of them were illiterate to moderately educated. So for the ease of getting data, the interviews were conducted in Bangla and then transcribed and translated into English. Five interviews were transcribed by two persons to check the variations and data loss.

The transcribed data were then organised and coded using MaxQDA 2012 for further analysis. The transcribed data were first coded using inductive open coding to generate ideas from the interviewees' description. In addition, coding was also done using a provisional code list generated from previous studies in the field to make those more specific to the research questions. Through coding and recoding of the transcripts at several cycles, a final code book on central theme was developed which was necessary to apply consistent codes to data representing similar ideas. The codes were then analysed to generate categories of factors which then were used to explain two major themes of the second phase of the study: location choice factors and cluster formation. Matrices were constructed from the codes by putting '1' against each case when certain codes appear in his interview transcript. Such matrices were used to identify patterns, make comparisons, and reveal paradoxes to answer the research questions. In addition to transcripts, field observation notes and photographs of the sites were also analysed to substantiate the data from the interview transcripts where applicable. Such use of multiple sources of data was expected to increase validity of the findings (Yin, 2014). Quotations were added to support the interpretation and discussion.

Analysis started with the development of two propositions (expected pattern) based on the review of prevailing theories and findings of studies in the field as presented in the previous section. Pattern matching was used to determine whether observed (empirical) pattern matches with the expected (theoretical) pattern in the 'Discussion and conclusion' section of the study.

Results

Major manufacturing SME and their location pattern in Khulna

In Bangladesh, SMEs constitute the largest sector of the economy in terms of numbers of firms (80% of all enterprises) and employment generation (40% of total employment) and thus play a pivotal role in economic growth (Chowdhury et al., 2013). SMEs also comprise over 91% of total manufacturing establishments (Bangladesh Bureau of Statistics (BBS), 2013). Khulna is the third largest city in Bangladesh located in the southwest of the country on the bank of river Rupsha and Bhairab. It is a metropolitan city with an area of 45.65 km² and a population density of 67,994 per square kilometre. Variety of manufacturing SMEs are playing important role in the socio-economic structure of the city. The survey conducted in the first phase of the study identified five major manufacturing SME categories: (i) light engineering, (ii) timber and furniture, (iii) bakery and food processing, (iv) leather shoe making, and (v) Agro-processing. SMEs other than these categories were very few in numbers and hence not

considered for mapping for this study. A brief description of the major categories is presented in Table 1.

The most of these firms fall under micro and small enterprises in terms of their number of employment and only a few are medium enterprises. Usually these SMEs collect raw materials from and sell their products in mostly local and within the country market. The firms are mostly located on rented spaces along the major transportation routes of the city and on leased spaces from different government authorities like Bangladesh Railway and local government offices etc. as shown in Fig. 1. Especially firms needing large space to operate like saw mills, rice mills, flour mills, and fish processing are found to locate on spaces adjacent to river Rupsha and spaces belong to the Bangladesh Railway Corporation. Light engineering and furniture shops are found to locate all around the city but they are found to cluster along the major roads. These firms are usually labour-oriented and use simple hand tools and small machineries.

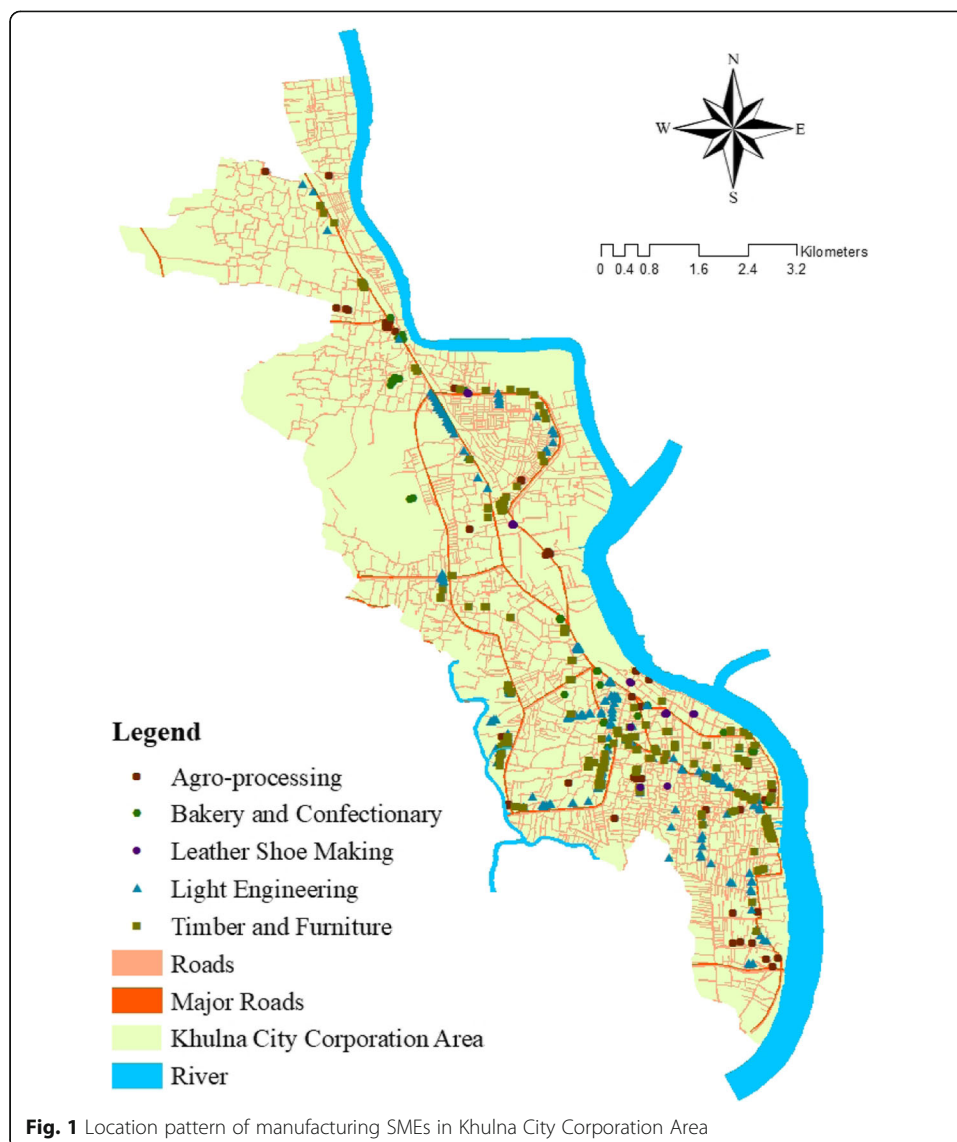
The results of optimised hot spot analyses depicted that the SMEs tend to spatially cluster in different locations of the city. The *light engineering* SMEs tend to show two hot spots locating in ward numbers 19, 20, 21, 29, and 30 as shown in Additional file 1: Fig. S1. The *timber and furniture* SMEs depicted three hot spots locating in ward number 19, 20, 24, 27, 29, 30, and at intersection of wards 9 and 12 as shown in Additional file 2: Fig. S2. Four spatial clusters were identified for *bakery and food processing* SMEs across the city located in ward number 6, 16, 20, and 22 as shown in Additional file 3: Fig. S3. Although very few in numbers, *leather shoe making* SMEs tend to cluster in two locations of the city—one at intersection of ward numbers 9, 14, and 15 and the other extending between wards 21 and 23 (Additional file 4: Fig. S4). The *agro-processing* SMEs demonstrated two clusters—one extending in wards 3 and 5 and the other locating at ward numbers 20 and 21 as shown in Additional file 5: Fig. S5.

Factors influencing location pattern of manufacturing SMEs in Khulna

A review on industry landscape around the world demonstrates that location selection is a strategic decision of entrepreneurs which are influenced by various factors. The entrepreneurs tend to select a location through making a balance between what they consider ideal and what they consider reality of the context using their subjective judgments. So, entrepreneurs' opinions were analysed to investigate what locations they considered ideal for locating factories, and why they selected a particular location for their firms and why a manufacturing SME cluster evolved at a location. Such comparison is useful in exploring

Table 1 Major manufacturing SME sector in Khulna Metropolitan City

| Sector | Types of firms | Numbers of firms located |
|----------------------------|--|--------------------------|
| Light engineering | Metal fabrication (metal window, doors frame etc.), metal furniture, machine parts manufacturing (lathes), and Bus body making | 327 |
| Timber and furniture | Saw mill, wooden furniture, and van body making | 288 |
| Bakery and food processing | Bakery and confectionary items manufacturing | 62 |
| Leather shoe making | Leather shoe making | 30 |
| Agro-processing | Rice mill, flour mill, oil mill, fish processing, spice mills etc. | 81 |



the factors and forces (if any) that influence the entrepreneurs to deviate from the optimum location selection specifically in the context of the study area. Ten (10) codes for ideal location, sixteen (16) codes for location selection, and twelve (12) codes for cluster formation were identified from the analysis of the interview transcripts through iteration process. The codes were then used to form categories and matrices, and discussed under three major themes: ideal location factors, location selection factors, and cluster formation factors as shown in [Appendix](#), Tables 3, 4, and 5 respectively.

Ideal location for SME manufacturing

From the opinions of the respondents of the study, it was found that large *open space* in *non-residential area* with *suitable transport facility*, *sufficient utility access*, *greater visibility*, and *greater access to market* is ideal location for establishing manufacturing units. Since such units have some degree of potentially harmful effect on the neighbouring community

due to noise, smoke, and dust they produce during operation, the respondents consider outskirts of city as ideal location. As respondent 9 who runs a bakery factory stated in response to the question what should be the ideal location for a factory that

...it should not be within the residential areas. It is because of the smoke. The smoke is harmful for the environment. My children, other's children and even I am affected for this. There is no proper arrangement for water, drainage or sewage disposal here for factory – it is set up without plan here.

Similar opinion was echoed in words of respondent 6 who owns a rice mill:

for this firm this is an ideal place... (because) the residential area is less here, open space is also available, open swamp is available, there is river beside, the smoke we produce will not do harm to anybody – it will vanish in the sky. The water, I mean the waste water easily flows to the river. Then, the road transport system is also good. Trucks can enter with paddy and there is also good facility for unloading paddy from the river. These are the reason why this place is ideal

In addition, locations where a number of similar firms *agglomerate* and locations with greater visibility have the potential to pull more customers and are considered as ideal locations. *Visible workshops* are expected to build trust among customers as well about the manufacturers and the products. As respondent 7, furniture workshop owner, mentioned that

More people generally come to that place where there are more shops.

Whereas another furniture workshop owner, respondent 10 argued that

In my opinion the showroom and the workshop is required in one location in case of wooden furniture. It is required to build trust among customers. ... if workshop and showroom locate at same location, we can have the opportunity to show our timbers to customer. Customers can have trust on us if they see the workshop.

Thus, the SME entrepreneurs possess a cognitive map of an ideal location which are based on their experience as an entrepreneur and community member and appreciation of the reality (e.g. customers' convenience and pollution) of the context where they operate.

Location selection factors by SME manufacturing entrepreneurs

The factors that were claimed to have influence on the location selection of majority of the respondents include availability of space, suitable transport facility, agglomeration of firms, and favourable personal factors. The word-cloud in Fig. 2 developed based on the frequencies of codes appearing in the interview transcripts of the entrepreneurs reflects that *location-specific factors* like open space, road and river, low-cost land, people circulation, agglomeration effects like mutual cooperation, business-centre, related-business; *community factors* like eviction, environment, and sound; and *personal factors* like capital shortage, proximity to residence, and acquaintance revealed as important from the opinions of the SME entrepreneurs in selecting locations.



The examples above indicate that more movements of people and hence greater visibility, convenience of transport, and space in the front are major causes of concentration of firms by the side of major roads. An interesting motivation for choosing locations beside major roads as found from several entrepreneurs (4 out of 15) was to utilise the available public spaces (sometimes even larger than the spaces rented) in front of the workshop for operation as shown in Fig. 3.

Entrepreneurs also tend to locate where a number of similar or related firms agglomerate. Such locations turn into a business centres (e.g. Labanchora beside river Rupsha and BIDC Road Khalishpur) and offer a number of agglomeration benefits to them such as customer pulling, customer convenience, mutual cooperation, supplier pulling, and provides a sense of unity. In the opinions of respondents

Benefit is that in order to purchase timber, everyone would come here if the saw mills localise at one place. This is the main and only benefit. And the second benefit is that the saw mills are located side by side at one place so if any saw mill centered issue arises we try to co-operate one another. – (Respondent 2, Sawmill owner)

That area is convenient to do business where there are other mills and business enterprises since that place turns into a business centre (MOKAM).... Buyers will think that they will get their desired products if they go there. Again who wants to sell paddy, he would think that he would be able to sell it if he goes to Labonchara. This is the business centre; there are many mills and factories here. – (Respondent 6, Rice mill owner)

Again, acquaintance with the local people; convenience in commuting from home to factory; looking after family; and ease in overseeing operations were important *personal factors* to locate manufacturing units near to residences as revealed from the following examples:



Fig. 3 Workers making door frame on public footpath beside a major road

... when I would start a shop in a new location it would take time to grab local customers and get acquainted with them. I live in this locality for last 20 years. People here knew me. But I could not sell any product to them. They used to see me at mosque only once during Jumma (Friday prayer for Muslims). But they did not go to my shop (when it was around 2 km away from here) since they used to forget about my shop and regretted that I purchased furniture but forgot about you. But now they can find me every day and if they need products they are coming to me- (Respondent 10, Furniture workshop owner)

it is coincidental that it (factory location) is located close to my house. My house is just beside the adjacent road and I just cross the road and reach to my factory. It is a great advantage to me. - (Respondent 2, Sawmill owner)

It is easier to commute from home. Living with family and children become easier.- (Respondent 8, Bakery owner)

Capital shortage was often found to restrict respondents' ability to select suitable locations for establishing workshops and force them to locate in isolated lanes. In words of respondent 11

Yes, the business will run well beside the major roads. But I don't have the capacity to run business there by establishing a shop. For example, one of my brothers has rented a shop there investing a hefty amount as down-payment/position money. That's why I don't even think of starting a shop there.

Increased visibility, access to utility services, presence of related businesses and other important institutions, access to customers, concern for environment and community, security, eviction, access to raw materials, and access to labourer are among other factors that influence location decisions of entrepreneurs. Although these factors are mentioned by less number of respondents, influence of these cannot be ignored. Since most of the manufacturing SMEs are located on rented spaces, there is always chance of eviction from that place and couple of respondents had to dislocate from their previous locations due to eviction. In Khulna City Corporation, area utility services are relatively accessible and may have been taken as granted by the entrepreneurs. So majority of the respondents might have not mentioned about this factor. Although there is scarcity of skilled labourers due to high labourer turnover, these firms develop their own mechanisms such as developing long-term relationship with the workers or inter-factory labour exchange, to tackle the scarcity. Thus, they do not feel access to labourer as an important location factor. Presence of *Boro-bazaar*, the central wholesale market for all kinds of products, and other market places in the centre point of the city made raw materials access easier and hence made this factor less important to the entrepreneurs.

Five respondents out of 15 mentioned that *community support* is important to establish and run manufacturing firms at a location since such operations often have harmful effect

on the community and environment. This was revealed from the opinion of respondent 4, a saw mill owner:

We are operating our business within the city but it is illegal. We are keeping our timbers on roadside and doing our business. The general people love us, administration loves us and most importantly Allah loves us. Otherwise it would not be possible to do business here. Actually it is not legal. But, can you say where we will go to earn our livelihood?

Thus, the SME entrepreneurs are knowingly selecting locations which is not ideal for manufacturing for their survival and it reflects to the tradeoff they are making in selecting a location decision.

Therefore, from the above discussion, the study proposition that *location selection is a strategic decision of entrepreneurs which are influenced by a combination of location specific, personal, and community factors* is confirmed.

Formation of manufacturing SME cluster

Manufacturing SMEs are found to cluster in different locations in Khulna City. *Availability of low-cost space, spin offs, agglomeration benefits, and improved transport facility* are found as the major reasons for firms' localisation in specific areas.

Low cost of space is a crucial force behind localisation of industries. The open government spaces along the embankment of the river Rupsha and the spaces belonging to Bangladesh Railway Corporation were found attractive to the entrepreneurs for its availability and low cost. As noted by respondent 3, Sawmill owner.

Once it was the embankment of river Rupsha. At that time the land was empty. Some people thought what could be done here. Then two or four people started timber/log business and found that it can be profitable...This was the starting point of this business in this area. Then it was found that this place is suitable for this business.

Respondent 6 also noted that *"those who wanted to start rice mill at the initial period found that there are empty lands which is ideal for rice mills. The price of land was also low that time. So they established rice mills here at that period"*.

Spin off firms also caused growth of different manufacturing SME industries and development of cluster of manufacturing SMEs in Khulna City area. This was also revealed from respondent 9:

When I came to Khulna, I saw 5 bakeries here... Later those who were hawkers and those who were production men started factories. They have taken spaces requesting Shaheb (land owner) that there are open spaces and we wish to set up factories.

Manufacturing SMEs like engineering workshops or furniture workshops often use simple hand tools in production and usually produce on job shop basis. In such case, they depend on advance payment from the customers and thus require less capital to start and sustain business. For this reason, workers often have the tendency to start

their own businesses which results in growth of spin off firms and clusters in a location. As revealed from respondent 10:

They (workers) think that if I start my own business, work there myself and can earn the 600 taka per day from it that I am getting from my employer now, it would be better for me. I will not need to work 9 am to 5 pm. I will not be responsible to anyone. Even I can earn mere 100 taka profit

Improved transport facility due to better access to roads and river transport systems is another important reason for localisation of manufacturing SMEs. Convenience of transportation, reduced transport cost, attracts more firms to locate at a location. As mentioned by respondent 2

All have selected this location because this business has need for river bank as well as road access and this place is ideal for both of these.

In addition to the above factors, presence of related business or cluster and occurrence of special events such as eviction can also promote cluster formation at a specific location. The furniture cluster at BIDC road, Khalishpur, developed due to the saw mill cluster of the same area and saw mill cluster of Labonchara developed due to the wood businesses previously developed there. Respondent 5, a furniture workshop owner of Khalispur, reported in response to the question why a lot of furniture shops are at BIDC road:

...it is a timber market. There are numerous saw-mills. Approximately 15/20 saw-mills are here where main business is wood sawing.

Whereas respondent 10 mentioned eviction from the railway land caused many of the furniture shops to dislocate and cluster at a new available location.

A major change has occurred within 3 years – from one furniture shop to 30-40 shops have been set up here. If businesses were not evicted from there (Railway land), it would have taken 5 to 7 more years to develop here.

Moreover, agglomeration of firms offers several benefits such as customer pulling, customer convenience, mutual cooperation, supplier pulling, and provides a sense of unity which also attract manufacturing SMEs to cluster in a location as evident from the previous section.

Thus, the proposition 2 'Conducive government policy, locational attractiveness/favourability, technology transfer and chance factor independently or in combination influence formation of cluster at a location' is partially confirmed from the data.

Discussion and conclusion

Manufacturing SMEs in Khulna Metropolitan City are found to cluster along the major roads of the city and in the open spaces beside the embankment of river Rupsha and along the railway route. Among the five SME categories considered in

the study, those which need relatively large open space like saw mill and rice mills were found to cluster more along the river side area and on railway land and those which need relatively less space but more visibility and direct contact with customers like furniture and engineering workshops were found to concentrate along both sides of the major roads. *Location-specific factors* like availability of low-cost space, suitable transport facility, and agglomeration were found to have more influence on location selection of the manufacturing SME entrepreneurs of Khulna City. Prevailing literatures on location choice, consistently with this finding, demonstrate that the availability of space and accessibility to improved transport system (Van Noort and Reijmer, 1999; Martyniuk-Peczek et al., 2017); proximity to the central business district and direct access to major roads (Kupke and Pearce, 1998); and agglomeration of similar firms (Kim, 2015) are important factors in location choice of SMEs. Unlike the findings of Jones and Woods, 2002; Renner, 1947 which suggest access to utility, availability of labourers, and proximity to source of raw materials are important location selection factors, this study found these factors to have less impact on entrepreneur's location selection in the context of Khulna.

Marshall (1920) postulated agglomeration invigourates re-agglomeration of firms due to the efficiencies the firms get through labour pooling, easy access to supplies and services, and knowledge sharing. Albaladejo (2001) claimed that social capital plays an important role in the development of the clusters and explained it as the shared vision, social interaction, mutual knowledge sharing, and trust among firms which promote the generation and diffusion of innovations within the cluster. Manufacturing SME entrepreneurs of Khulna also prefer to locate at places where agglomeration of firms occurs but they are more market focus in such decision, i.e. to get more customer access. Moreover, such agglomeration allows the firms to cooperate one another in times of need and creates a sense of unity among them that provides mental support against any unwanted external events such as extortions. Thus, the role of social capital in this context is found to be more defensive than invigorative since shared vision and collective efforts to grow as an organised cluster were not evident from the study. Moreover, the clusters found in different locations of the city are naturally grown without any government initiative and the firms in those clusters are not firmly integrated to each other by means of business support or local business associations.

The study also revealed that location choice of entrepreneurs is influenced by *personal factors* including proximity to residence, acquaintance with local people and location, ability to arrange capital, and concern for family and children. These findings are also consistent with the prevailing literatures. Liang et al. (2001) claimed that small manufacturers' location choices are often influenced by personal factors like local residence, local customers, access to funds and other facilities. Mazzarol and Choo (2003) claimed that proximity to home was more important than transport access in selecting location. SME entrepreneurs in Khulna were seriously constricted by the low ability to raise capital in selecting suitable locations since access to low-cost loan is extremely limited for them due to collateral requirement. This often compel them to confine at smaller spaces than required for operation, find low-cost spaces in lanes at the cost of market access and transport convenience. It was also found from the analysis that SME manufacturers

consider *community support* is important for setting up and running of manufacturing units within the city.

This study attempted to identify whether the entrepreneurs select the ideal/optimum location or just satisfactory location for their manufacturing units. It was important to understand whether the SME entrepreneurs act rationally or make tradeoffs in decision-making prioritising any specific factor over others. An interesting contrast between what the respondents consider as ideal location and the location they ultimately choose was found from the study. Open space in non-residential area was considered ideal due to possibility of various pollutions but most of the SME manufacturing units were found to locate in the residential areas of the city. This is due to unavailability of open spaces and lack of capital to acquire costly and scarce spaces in commercial areas and outskirts of the city. Although the respondents believe that locating factories in residential areas is unethical, they are continuing their businesses in such locations as they have no alternative to survive. Moreover, proximity to residence and better quality of life in the city restrict them to move to the outskirts of the city. Thus, it indicates that *personal factors* get prioritised over *location-specific factors* while choosing ultimate location which is also consistent with the findings of (Martyniuk-Peczek et al. 2017) which shows that SME entrepreneurs in suburbs of Poland favoured personal reasons over cost.

The study revealed little differences in location choice factors across different categories of SMEs. The availability of low-cost space, suitable transport facility, firm agglomeration, capital shortage, and proximity to residence are common location choice factors influencing SME entrepreneurs in most of the categories. However, firms requiring direct consumer access like furniture and light engineering workshops consider increased visibility of the location as very important for location selection.

Moreover, analysis on cluster pattern demonstrated that all categories manufacturing SMEs tend to cluster at multiple locations in different wards of the city. The prevailing literature on evolution of industry clusters suggests conducive government policy (Yamawaki, 2002; Brown, 2000), technology transfer, chance factor (Krugman, 1991), spin offs (Brown, 2000), and locational favourability such as existence of related industry cluster, presence of supporting industries like research and development institutions or universities, favourable infrastructure (Yamawaki, 2002), availability of human capital (Basant, R, 2006), availability of input supplies, and historical accidents/circumstances (Krugman, 1991) are major reasons for cluster formation in a location. In case of manufacturing SMEs in Khulna City, existence of related businesses, availability of low-cost space, growth of spin off firms, agglomeration benefits, unexpected events like evictions, and improved transport facilities were found to be the reasons behind cluster development. It was also found there was no government initiative for such development. The manufacturing firms were found to use simple hand craft technologies in production and so the scope for technology transfer was limited. Formal linkages with supportive industries were also not evident in the study. Firms often locate close to other related firms to gain access raw materials or market. Moreover, concentration of manufacturing SMEs along the major roads was attributed to more movements of people and hence greater visibility, improved accessibility to customers, convenience of transport and more interestingly, available public space

in front of the workshops for operational use are major causes of concentration of firms by the side of major roads.

Comparison of the empirical findings (observed pattern) with the prevailing literature (expected pattern) in this field suggests consistency in the reasons behind location selection and cluster formation of manufacturing SMEs. Yet this study contributes to fill the gap in literature on SME location selection behaviour in the context of developing countries like Bangladesh which were extremely limited. The study also contributes to the literature through presenting few factors which are very specific to the local context of Khulna such as motivation to use unauthorised public space to overcome space and capital shortage, lack of government support, and limited scope in technology transfer although the findings are broadly consistent with extant literature. The study also reflected to the lack of sufficient provisions for accommodating these kinds of SMEs in city development planning and revealed the need for development of a planned industrial zone to accommodate these manufacturing SMEs just outskirts of the city to avoid the harmful effect on environment and community specifically in the residential area.

The findings of the study may be useful to city planners in developing future plans for city development. A provision for developing an industrial zone just outskirts of the city around Zero Point along Khulna-Shatkhira and Khulna-Mongla connecting highways can be considered since the city is expanding in that direction. Moreover, availability of open space, presence of Khulna University as a source of innovation, and good connectivity by roads and railway (under construction) with Mongla seaport and capital city Dhaka raise the potential of this area for such industrial zone. Such industrial zones should ensure sufficient community facilities such as proper living space, education, and healthcare facilities for the entrepreneurs, workers, and their family to encourage them to setup factories there since these personal factors often prioritised over location-specific factors. Overcoming capital shortage is a major problem for locating firms in ideal location. Although government has taken few policies for providing simple loan facilities for SME entrepreneurs, measures need to be taken for proper implementation of those policies to reach the benefits to them. Policymakers should also encourage SME entrepreneurs to build formal more integrated business clusters through arranging training programs after identifying potential sectors so that these clusters can generate greater productivity for themselves and in aggregate for the region.

The study was conducted only on manufacturing SMEs of Khulna City Corporation so the findings may differ for SMEs in service and trading sector and for large enterprises. The findings may also differ if similar study is conducted on manufacturing SMEs located in the outskirts of the city, in other cities, or rural areas due to difference in socio-economic conditions. The study used personal interviews of small number of cases to generate deeper insights why and how location decisions are made and do not expect to generalise the findings statistically. Rather the study focused on ensuring analytic generalisation since for *qualitative study design*, analytic generalisation or methodological clarity/rigor is more important than statistical generality (Bryman, 2012: 406). Further research may be conducted on other sector of the SMEs to find whether any variations exist in location choice and how socio-economic variation of different cities influences the location selection of manufacturing SME entrepreneurs.

Appendix

Table 2 Definition of small and medium enterprises in Bangladesh

| Category | Cottage enterprise | | Micro enterprise | | Small enterprise | | Medium enterprise | |
|---------------|--------------------|--------------|--------------------|--------------|--------------------|----------|----------------------|----------|
| | Fixed asset (Taka) | Manpower | Fixed asset (Taka) | Manpower | Fixed asset (Taka) | Manpower | Fixed asset (Taka) | Manpower |
| Manufacturing | Less than 5 lac | Less than 10 | Less than 5 lac | Less than 10 | 50 lac to 10 crore | 25–99 | 10 crore to 30 crore | 100–250 |
| Service | | | Less than 5 lac | Less than 10 | 5 lac to 1 crore | 10–49 | 1 crore to 15 crore | 50–100 |
| Trade | | | Less than 50 lac | 10–24 | 5 lac to 1 crore | 06–10 | 1 crore to 15 crore | 11–50 |

The enterprise is also not a public limited company. Source: compiled from BB Circular No. SMESPD 4 dated July 14, 2015

Table 4 Location choice factors

[illegible]

Table 4 Location choice factors (Continued)

Table 5 Localisation/cluster formation factors

| | Available low-cost space | Spin offs | Related business | Improved transport facility | Agglomeration effect | Increased visibility and customer access | Space in the front | Access to supplies | Access to labour | Eviction | Conducive government policy | Chance factor |
|---------|--------------------------|-----------|------------------|-----------------------------|----------------------|--|--------------------|--------------------|------------------|----------|-----------------------------|---------------|
| Resp 1 | | 1 | | | | | 1 | | | | | |
| Resp 2 | 1 | | 1 | 1 | 1 | | | | | | | |
| Resp 3 | 1 | | 1 | | | | | | | | | |
| Resp 4 | | 1 | | | 1 | | | | | | | |
| Resp 5 | | 1 | 1 | | 1 | | | | | | | |
| Resp 6 | 1 | | | 1 | | 1 | | | | | | |
| Resp 7 | | | | | | 1 | 1 | | | | | |
| Resp 8 | 1 | | | | 1 | | | | 1 | | | |
| Resp 9 | 1 | 1 | | | | | | | | 1 | | |
| Resp 10 | | | | | | | | | | 1 | | |
| Resp 11 | | | 1 | 1 | | | | | | | | |
| Resp 12 | | | 1 | | | 1 | | | | | | |
| Resp 13 | 1 | | 1 | | 1 | | | | | | | |
| Resp 14 | 1 | | | | | | 1 | | | 1 | | |
| Resp 15 | | | | | 1 | | 1 | | | | | |
| Total | 8 | 4 | 6 | 3 | 6 | 3 | 4 | 0 | 1 | 3 | 0 | 0 |

Table 6 Case information

| Cases/ interviewee | Industry type | Products | Location | Establishment year |
|-----------------------|-------------------------------|----------------------|------------------------------------|-----------------------|
| Case 1 | Light engineering | Metal fabrication | Khan Jahan Ali Road | 1988 |
| Case 2 | Timber and furniture | Saw mill (timber) | Rupsha | 1995 |
| Case 3 | Timber and furniture | Saw mill (timber) | Rupsha | 1970 |
| Case 4 | Timber and furniture | Saw mill (timber) | Khalishpur | 1977 |
| Case 5 | Timber and furniture | Furniture | Khalishpur | 2012 |
| Case 6 | Agro-processing | Rice mill | Labanchara Rupsha | 2017 |
| Case 7 | Timber and furniture | Furniture | Khan Jahan Ali Road | 2002 |
| Case 8 | Bakery and food processing | Bakery | Jora gate, Prem kanon | 2000 |
| Case 9 | Bakery and food processing | Bakery | Koylaghat Kagoji Bari | 1990 |
| Case 10 | Timber and furniture | Furniture | MA Bari Road, Shobujbagh | 1997 |
| Case 11 | Timber and furniture | Furniture | Boyra Bazar | 2002 |
| Case 12 | Leather shoe making | Shoes and sandals | Railway Junction Road, Boikali | 2015 |
| Case 13 | Agro-processing | Rice mill | Daulatkhan Road, Daulatpur | |
| Case 14 | Light engineering | Metal fabrication | Sher E Bangla Road | 1995 |
| Case 15 | Light engineering | Metal furniture | Upper Jessore Road, Sheikh para | 1993 |

Supplementary information

Supplementary information accompanies this paper at <https://doi.org/10.1186/s40497-019-0187-x>.

Additional file 1: Figure S1. Light engineering SME clusters in Khulna City.
Additional file 2: Figure S2. Timber and furniture SME clusters in Khulna City.
Additional file 3: Figure S3. Bakery and food processing SME clusters in Khulna city.
Additional file 4: Figure S4. Leather shoe making SME clusters in Khulna City.
Additional file 5: Figure S5. Agro-processing SME clusters in Khulna City.

Abbreviations

BBS: Bangladesh Bureau of Statistics; DCR: Duplicate Carbon Receipt; SME: Small and medium enterprises; GDP: Gross domestic product; GIS: Geographic Information System; SMEF: Small and Medium Enterprise Foundation

Acknowledgements

Not applicable

Authors' contributions

TR carried out the main research as part of his ongoing Doctoral degree requirement under the close supervision of AK. TR was responsible for the data collection, transcription, analysis, interpretation, and writing the manuscript. AK helped in conceiving of the idea of the research, guided in the analysis, and assisted in drafting of the final manuscript. All authors read and approved the final manuscript.

Funding

The study was self-funded by the corresponding author and no fund was available from any authority.

Availability of data and materials

The dataset generated and analysed during the current study is not publicly available since it is based on personal interview of respondents who wants not to disclose their names but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Received: 26 May 2019 Accepted: 1 October 2019

Published online: 28 November 2019

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