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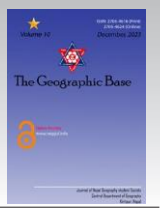

Modeling of Spatial Economic Activities: A Case Study of Kirtipur Municipality

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Abstract

This paper investigates the spatial micro-econometrics of businesses within Kirtipur Municipality. Primary data was collected through field surveys, and observations, supplemented by secondary sources. Findings revealed an increasing trend in firm establishments, particularly along roadsides, with wards 9 and 10 hosting more firms than wards 7 and 8. Proximity to road access positively correlated with establishment numbers. Ward 6 showed significant establishment presence due to factors like road accessibility and raw material availability. The study's modeling analysis indicated a relation between the distance from main roads and the likelihood of new firm establishment. Positive spatial externalities were observed, which implies that the beneficial effects that arise from the geographical proximity or spatial arrangement of economic activities, individuals, or firms – cause with new firms to cluster around existing ones. Manufacturing industries experienced the highest growth rate at 366.7%, while sectors like petrol pumps and schools exhibited more modest growth rates of 27.3%.

This research provides valuable insights into the spatial economic dynamics of Kirtipur Municipality, including firm establishment, growth patterns, and the influence of spatial factors which refers to geographical location, distribution, and arrangement of economic resources, firms, and individuals, on economic activities.

Introduction

Economic Geography delves into the patterns of population and economic activities, encompassing differentiations between industrial and agricultural zones, urban agglomerations, and the clustering of related industries. The persistence of these clusters can be attributed to the concept of agglomeration economies, whereby the concentration of economic activities in specific geographic areas creates an advantageous environment that promotes further concentration (Fujita, Krugman, & Venables, 1999).

Given the diverse geographical, economic, and social facets of Nepal, a distinctive strategy is imperative to foster a harmonized approach to economic development. Historically, Nepal has adopted a regional approach aimed at achieving equilibrium between the expansion of rural areas and urban centres (Gurung, 2005). Initially, Nepal conceived growth axes that traverse the north-south axis, connecting diverse natural regions with the aim of synchronizing and coordinating development initiatives. Comprehensive development planning must encompass the entirety of the national territory, recognizing the variegated natural and human resources present in each distinct area. This strategic approach should outline how these resources interact, thereby shaping a coherent spatial framework that propels equitable growth. However, the intricate matter of land utilization has regrettably been largely overlooked in the planning endeavors of Nepal (Gurung, 2005).

The spatial allocation of economic activities is the result of a dynamic interplay between agglomeration forces, which draw economic endeavors towards specific geographical locations, and dispersion forces, which disseminate economic activities across neighbouring regions (Goffette-Nagot & Schmitt, 1997). The racetrack economy model amalgamates factors such as transportation costs, economies of scale, and consumer preferences for diverse choices. This model ingeniously integrates these aspects with traditional microeconomic theories to envisage a scenario where cities are uniformly distributed, much like the hands of a clock (Krugman, 2008).

Frameworks have been meticulously developed to model economic endeavors (Arbia, 1996) and business behavior within the spatial distribution of vegetation. Simulations in economic demography shed light on the behaviors of businesses within various regions (Dijk & Hacker, 2000). However, in an endeavor to effectively address the

complexities of the Modifiable Areal Unit Problem (MAUP) and leverage proximity as a predictive tool, researchers are diligently working towards elucidating the underlying rationale behind firms' deliberate selection of specific spatial locations (Arbia, 2001). This study was carried out to examine the situation of the firms' establishments, to find out the birth modeling of firms, and to investigate the survival and growth of the firms.

Methods and Materials

Study Area

The study was carried out from November 2022 to December 2022 in the Kirtipur municipality, Kathmandu district of Nepal located at 27°38'37" and 27°41'36" North latitude, and 85°14'64" and 85°18'00" East longitude at an average elevation ranging from 1284 meters to 1524 meters above sea level. The geographical boundaries of Kirtipur Municipality are well-defined, with the Bagmati River marking the eastern boundary, Chandragiri Municipality on the western side, the Kathmandu Metropolitan City to the north, and Dakshinkali Municipality to the south. The total area of Kirtpur municipality is 14.74 square kilometers with 10 administrative wards.

Research Design and Data Collection

The research design for the study is comprised of both descriptive and analytical research, which focuses on critically evaluating and interpreting information to understand complex issues, and patterns, such as modeling. To examine the process of birth, growth, and survival the time slot is used to calculate the empirical relationship. To find out the major drivers of a firm's growth and survival, the qualitative method is used and with some assumptions as related to the study area. QGIS 3.28.0, Google Earth Pro, Advanced Excel, JotForm's (Online tools) were used for quantitative data and Interviews, and KII (Key Informant Interview) were used for the qualitative data. Also, used of different theoretical and empirical literature reviews to more synthesize the research. The secondary data, especially business registration data, were captured from Kirtipur Municipality for cross-verification of the established firms in the municipal area.

Using a set of questionnaires in JotForm, a field survey was carried out. The form was shared among the firm's proprietors, staff, and other relevant personnel. The responses were exported to Excel, where data cleaning was performed. Finally, the cleaned data was categorized based on whether the firms were established on or before 2075 BS or after 2075 BS. All the analyzed data were presented on maps, tables, bar diagrams, timelines, and finally the empirical relationship was examined between firm intensity and with factors associated with it. Then the spatial concentration of new firms as the interaction with old firms was carried out by using a total number of firms established in the survey area -local density or intensity of the process

for modeling of economic activities with some assumptions. Further, analysis was carried out by using regression analysis using R and advanced Excel. Finally, to find out an empirical relation, which means spatial modeling of establishments at Kirtipur Municipality, and its interpretation.

Establishments of Firms at Kirtipur Municipality

Numerous studies and surveys were conducted for firms' establishments study in Nepal. Among them, according to the National Economic Census (NEC), 2018 there were 4510 firms and establishments in Kirtipur Municipality which include accommodation and food, financial and insurance, education, human health and social welfare, real estate and Professional, manufacturing and ICT. With the assumption on confidence level of 90%, and population as per the NEC, 2018 survey, the researcher conducted a sample survey of 100 firms of diverse types within the municipality area. For the purposes of research and subsequent analysis, firms established on or before 2075 BS were categorized as 'Existing' while those established after this point were classified as 'New'. An overview of the survey data is presented in Table 1. From the 100 firms surveyed, it was observed that a total of 83 firms fall under the category of 'Existing' or older establishments, while the remaining 17 were identified as 'New' firms in the study area.

Table 1: Types of firms' Establishments at Kirtipur Municipality

SN	Type of Firms	Numbers	New	Existing
1	Agricultural Farm	9	1	8
2	Bank	9	4	5
3	Hospital	6	0	6
4	Hotel and Restaurant	19	3	16
5	Manufacturing Industry	14	3	11
6	Mart / Departmental Store	11	2	9
7	Petrol Pump	1	0	1
8	School	14	0	14
9	Telecommunication Services (ISP)	6	2	4
10	Others	11	2	9
Total		**100**	**17**	**83**

Source: Field Survey, 2022

Results and Discussion

Analysis of the Birth of Firms

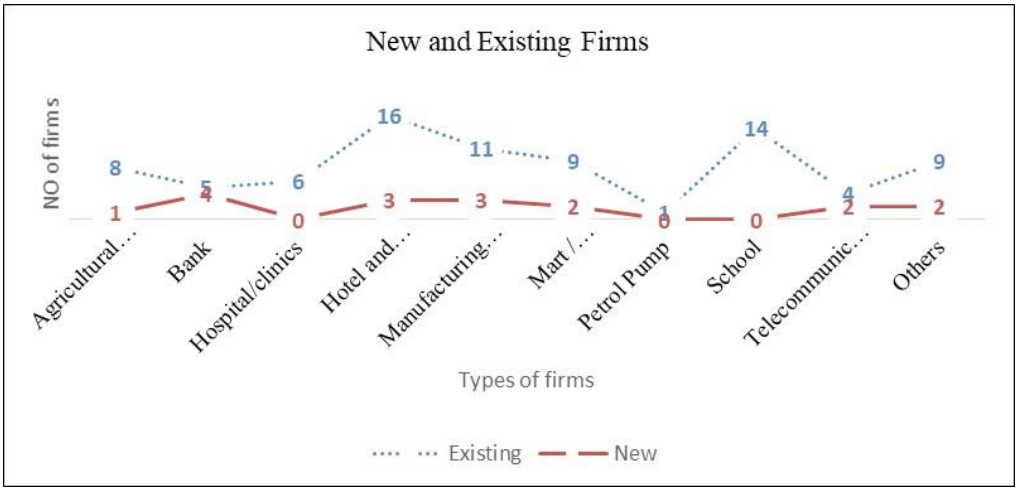

Figure 1: New and Existing Firms in Different Economic Activity in Study Area

Based on the examination of firms surveyed in 2022, it was determined that out of the total, 17 firms had been recently established, while the remaining 83 were pre-existing entities within the study area, as illustrated in Figure 1.

The accompanying chart provides a comprehensive breakdown of firm establishments according to categories. Figure 1 highlights specific insights into the distribution of businesses across categories. Prior to the year 2075, there were a total of 5 banks presented in the study area. Subsequently, an additional 4 banks were established post-2075. In contrast, the number of petrol pump establishments remained consistent, with one being present prior to 2075 and no further additions observed thereafter. There was highest fluctuation in the number of hotel and restaurant, as they were increased from 3 to 19 and later added 16. Also, the schools, telecommunication services, and manufacturing industry increased as described by the chart and figure 2.

To introduce a birth process of the firms in the study area denoted as A, consider $u = [u_1, u_2]$, where ($u_1, u_2 \in A$) represents the spatial coordinates of the firms. Let N be the total number of firms located in A, and D_i (i = 1, . . ., N) be the dimension of the i^{th} firm (measured, for instance, by factors such as the number of employees or gross product). Additionally, $\delta(u)$ represents a region in the neighbourhood of the point with coordinates u.

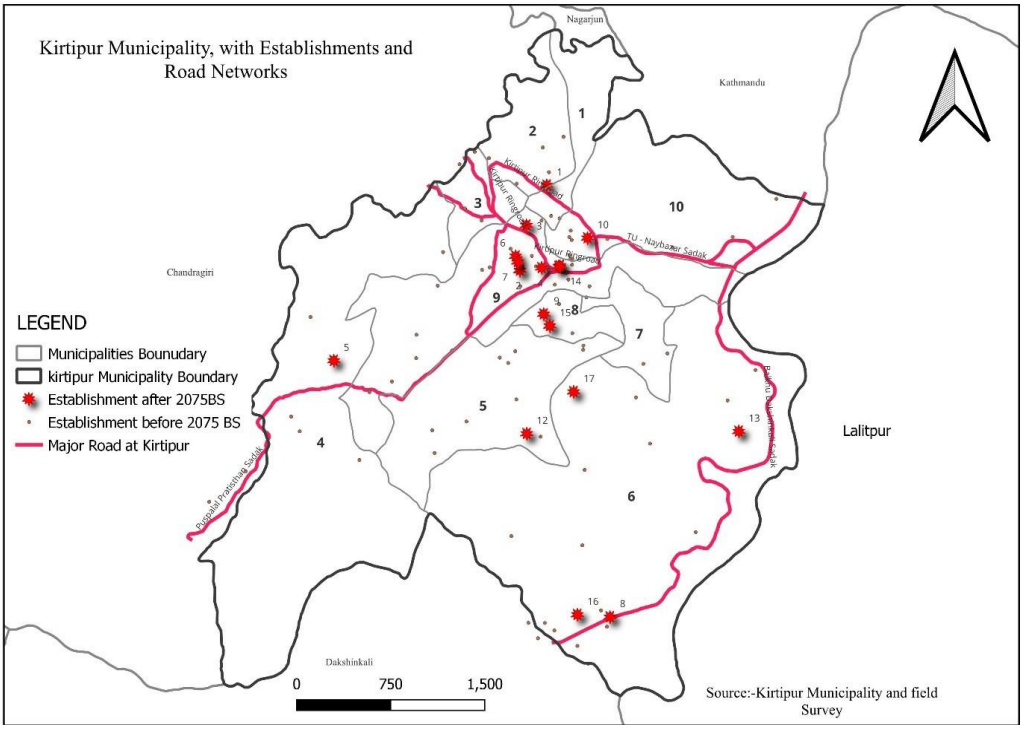

Figure 2: New and Existing Firms in the Study Area

Equation 1

The expected number of firms in the infinitesimal area is represented by λ(u), denoting the local density of the process. This concept is also referred to as the intensity, drawing from methodologies described by Diggle (1983) and Rathbun and Cressie (1994) as shown in equation 1.

$$\lambda(\mathbf{u}) = \lim_{\boldsymbol{\delta}(\mathbf{u}) \to \mathbf{0}} \frac{E\left[N\left(\boldsymbol{\delta}(\mathbf{u})\right)\right]}{\boldsymbol{\delta}(\mathbf{u})}$$

In the case of a stationary process, λ(u) remains constant throughout the area A. This leads to the emergence of three paradigmatic scenarios: (i) complete spatial randomness: in this scenario, the distribution of firms is entirely random and lacks any discernible pattern, (ii) inhibition: here, firms are more dispersed compared to the random case, indicating a tendency for firms to avoid clustering closely together, and (iii) concentration: this scenario suggests that firms are clustered in certain areas, showing a higher degree of spatial concentration. However, these three situations are overly simplistic and fail to capture the complexities of real-world scenarios where economic factors lead to irregular patterns of firm locations. To address this, a more realistic approach is to develop a birth process for firms in which the spatial intensity is non-stationary and varies across the economy based on

location. This approach, as proposed by Arbia (2001), as in equation 2.

Equation 2

$$\lambda(u) = \exp\{\beta_0 + \beta_1 d(u) + \beta_2 W(u) + \beta_3 X + \beta_4 R + \Phi(u)\}$$

where,

$\lambda(u)$ = Intensity of process in the point of co-ordinates u_0.

B_0, β_1, β_2, β_3, β_4 are the parameters to be calculated

d(u) = distance of the point at u from the roads, transmission networks and other indicatory points

W(u) = Intensity of the interaction of the new or existing firms and other firms located at point u.

X = independent variable such as demand or unitary transport costs

R = dependent variable such as local taxation, incentives

$\Phi(u)$ = error term, as per the assumed conditions such as Gaussian, spatial stationery and spatial correlations.

As depicted in Table 2 information regarding establishments with numbers of new firms., old firms and the shortest distance from the nearest road in that area. As described in the table, there are 17 new firms in the study area, each firms have different numbers of old and new firms inside the 0.5 km radius. Big Mart Store has 10 old firms and 2 new firms inside radius of 0.5 km with 49.60 m from the nearest road whereas EHWA Consultancy has 27 old firms and 7 new firms inside the 0.5 km radius and 50.98 m from the nearest road. In a similar way, Nepal Intermodal Transport has 2 old firms and a new firm inside the 0.5 km circle and 268.65 m distance from the nearest road.

Table 2: Firms at Kirtipur Municipality with Circular and Lowest Distance d(u)

SN	New Economic Point Name	No of Old Firms at 0.5 km	No of New firms inside the 0.5 km Circle	d(u) in meters
1	Big Mart Store	10	2	49.60
2	Compute Ch Infosis	24	6	160.81
3	DRS enterprises	25	7	49.42
4	EHWA Consultancy	27	7	50.98
5	Greenery viewpoint resort	4	1	197.84
6	Hours Motorcycle Dealer	25	6	159.62
7	Jyoti Bikas Bank	26	6	181.90
8	Kipu Durbar Party Palace	5	2	7.14
9	Kirtipur Cineplex	23	4	227.55
10	Kirtipur Football Ground	22	4	55.19

11	Kumari Bank Ltd	26	9	36.30
12	Layaku Darbar	3	2	872.72
13	Nepal Inter modal Transport	2	1	268.65
14	Sanima Bank Ltd	26	9	44.39
15	Sathi Mart	18	4	329.56
16	Sunrise Bank,	8	2	135.52
17	Zerina Breeding House	6	2	878.69

Source: Field Survey, 2022

Empirical Modeling of Firm's Birth Process in the Kirtipur Municipality

For the empirical modeling of the firms' birth process in the study area, researcher was presented the survey data onto the birth model. The set of data were modelled into the application of firm's birth modeling. The data were referred to the location of different firms in the Kirtpur Municipality. The Kirtipur Municipality was selected for economic modelling due to its small geographical area, which offers a wealth of data on economic activities. Furthermore, although the data pertaining to a relatively small region, approximately 14.72 square kilometers in size, they provide a comprehensive description of an autonomous region. This region possesses unique characteristics, including municipal laws, tax regulations, and municipal political boundary that set it apart from other areas. Additionally, the region boasts a well-developed road infrastructure, with no significant physical barriers hindering industrial settlements. Figure 3 illustrates the locations of 100 manufacturing industries present in the fiscal year 2079 BS. Among these firms, seventeen were established after 2075 BS and are indicated with a "*" symbol on the same graph. Further geographical analysis with the paths of the main roads, including highways that traverse Kirtipur Municipality, the Kirtipur Ring Road, and other major roads with rights-of-way exceeding 14 meters clustering the firms in the vicinity of the main roads and in close proximity to the primary highway, indicating patterns of agglomeration in these areas.

Equation 3

In the numerical example presented here, the researcher employs a simplified version of Krugman's spatially continuous model. In this simplified model, the intensity of new firms is influenced solely by two factors: their distance from the main roads and their interaction with pre-existing firms. Given the unique characteristics of Kirtipur Municipality, it is justifiable to disregard spatial variations in transport

costs, demand for goods, and regional policy measures. Consequently, the spatial intensity of new firms, denoted as λ(u), can be expressed as per in equation 3.

$$\lambda(u) = \exp\{\beta_0 + \beta_1 d(u) + \beta_2 W(u) + \Phi(u)\}$$

Equation 4

Where, d(u) = distance (m) of each point of coordinates u from the closest road. For the interaction term W(u) researcher assumes the specification proposed in Arbia (1996). In this case, W(u) can be further defined as per equation 4.

$$W(u) = \begin{cases} \sum_i \exp[-r_i(u)], & if\ r_i(u) \le 0.5\ kilometers \\ 0, & Otherwise \end{cases}$$

Equation 5

In the expression above, the index i ranges from 1 to 83, and $r_i(u)$ represents the distance between a firm with coordinates u that was established after the fiscal year 2075 BS and the i^{th} firm that already existed before 2075 BS. The interaction between firms is limited to those falling within a circle with a radius of 0.5 kilometers. The error term Φ(u) is initially assumed to exhibit characteristics of a continuous-space stationary Gaussian distribution with a zero mean. For estimation purposes, this error term is subsequently discretized onto a regular grid consisting of 50-by-50 squares. Each square on this grid is represented as Φ(uij), where i ranges from 1 to 50, and j ranges from 1 to 50 and it is assumed conditionally Gaussian as per equation 5.

$$E(\Phi(u_{ij}|Neighbours) = \gamma \sum_i 0 \sum_j w_{ij}\Phi(u_{ij})$$

The relationship between squares i and j on the grid is determined by the weight w_{ij}, which is set to 1 if the i^{th} and j^{th} squares are neighbors and 0 otherwise. The variance of the error term $\Phi(u_{ij} \mid$ neighbors) is denoted as τ^2.

As the error term is not directly observable, an estimation technique based on the Expectation-Maximization (EM) algorithm, as modified by Rathbun and Cressie (1994) and originally proposed by Dempster et al. (1977), is employed. The Excel Solver with the GRG (Generalized Reduced Gradient) non-linear engine is used to compute the expected values of the conditional distributions. The estimation process involves minimizing errors using the chi-square test. It's worth noting that ad hoc routines are employed in the computation of expected values as part of this estimation approach. Furthermore, the estimation gave the standard error as well which gives the information how closeness the calculations for fitting into the assumptions and equation.

By using the solver to fit these data on the modeling equation of the birth process at Kirtipur Municipality, then researcher obtain the following model.

$$\lambda(u) = \exp\{1.2702913 - 0.000322935\, d(u) + 0.009087813\, W(u)\}$$

With the sum of the square of the standard error of 17.70742904.

Based on the assumption that the nature of the firm's birth process depends on various factors such as transport costs, demand for goods, regional policy measures, etc., the researcher applied a specification recommended by Arbia (1996) for modeling purposes. When plotting the data on a graph with both calculated and actual values of the model, the resulting plots, shown in Figure 4, reveal some fluctuations. These fluctuations indicate that while certain factors are considered in the modeling, there may be other influential variables at play. Notably, when the x value is lower (indicating less error), the result (y) is more stable. However, increasing the x value leads to greater fluctuation in the results.

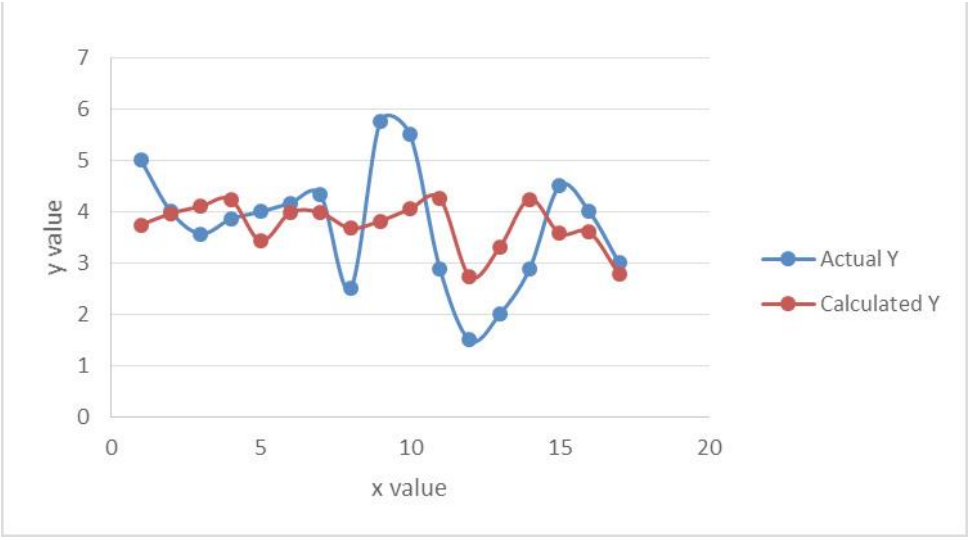

Figure 4: Actual vs Calculated Chart of Modeling of the Firms

The proportionality constant of the model, estimated as $\beta_0 = 1.2702913$, doesn't carry any substantive meaning as it encompasses the sum of error terms and residual values. However, the negative value of β_1 suggests a negative relationship between the distance from main roads and the probability of firms establishing new locations. This result aligns with theoretical expectations, as proximity to main roads facilitates easier access and shipment of raw materials and goods. Conversely, the positive value of β_2 indicates a positive interaction between the location of new firms and the presence of previously established firms. This implies that the probability of new firms locating in proximity to existing ones is higher, reflecting positive

spatial externalities commonly observed in economic geography situations (Griffith 1999). Additionally, the standard deviations are generally small when compared to the absolute values of the point estimates.

This interpretation suggests that the estimated model provides a strong representation of reality, particularly in the context of economic activities within Kirtipur Municipality. The model effectively captures the econometric relationship between factors such as distance from road access, the growth of economic activities over the past five years, and the spatial configuration of categorical establishments of economic activities in the municipality. This alignment between the model and real-world economic dynamics underscores its utility in understanding and analyzing the economic landscape of Kirtipur Municipality.

Analysis of Survival of the Firms

Survival and growth modeling of firms which deals with the success or failure of the firms. This study plays a crucial role in analyzing the dynamics of firms' performance, identifying determinants of success or failure, and informing policymakers and entrepreneurs about strategies to improve firm outcomes. The birth process, as discussed earlier, can be augmented with a death/ survival process. This inclusion accounts for the dynamic aspects of firm establishment and persistence, aligning with the approach proposed by Arbia (1996).

In the dynamics of the survival of the model, the researcher defines the survivorship $M_i(t)$ as written in equation 6.

$$M_i(t) = \begin{cases} 1, & if\ the\ ith\ firm\ survives\ at\ time\ t \\ 0, & otherwise \end{cases}$$

And the survival with the conditional probability at time t+1 which can be written as per in equation 7.

$$P_i(t+1) = Prob\{M_i(t+1,\theta) = 1 | M_i(t,\theta) = 1\}$$

In the modeling approach, researcher assumed that the survival of firms at time t + 1 depends on several factors. These factors include the size of the firm at time t, the competitive impact (whether positive or negative) from neighboring firms, the overall growth of the sector at a broader scale (nation-wide or regionwide), and a set of explanatory variables and regional policy instruments. To further refine our modeling, we employed a logistic transformation to represent the probability Pi, as outlined in the equation above. This transformation allows us to model the survival probability using a spatial auto-logit model, a statistical technique introduced by Heagerty and Lele in 1998. This approach enhances our ability to analyze and predict the survival dynamics of firms while accounting for spatial dependencies and other relevant factors.

Depending on the types of firms, the firms established at the study area researchers analyzed how many firms closed due the different constraints such as government policy, financial situation, market, and other factors. As per the survey 2022, there were found that there were not any such establishments were closed. The details firm establishment with year are shown in Figure 5.

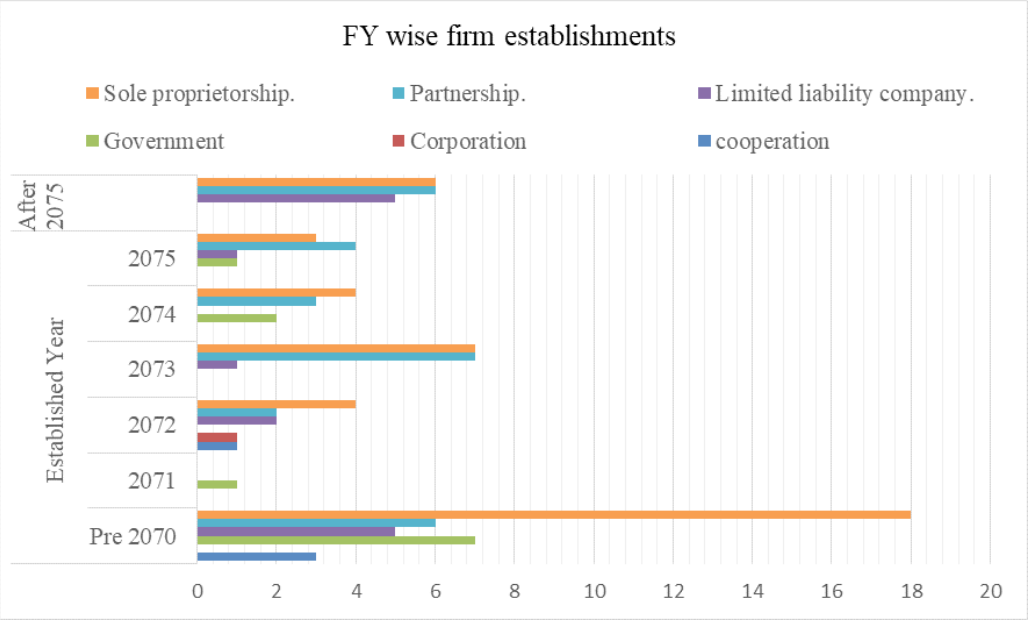

Figure 5: FY wise Firm Establishments

As illustrated in the charts, a total of 39 firms were established collectively before the year 2070. Subsequently, there was an increment in the number of firms established during the period from 2071 to 2075. After 2075, there were 75 additional firms established in the study area.

Upon scrutinizing the survival patterns of the firms, it was observed that no firms had been dissolved based on the researcher's survey. However, an interesting trend emerged: the nature of operations conducted by these firms exhibited a broadening. In other words, while no firms were dismantled, many firms diversified their areas of operation within the study area.

Analysis of Growth of the Firms

Indeed, the birth and death/survival models primarily address the presence or absence of firms within a given spatial context. However, there is an additional dimension to spatial concentration within the growth process of existing firms that should be considered. This second source of spatial concentration relates to how established firms evolve and expand

within the spatial landscape, which can significantly impact the overall economic dynamics of the region. To further analysis of the firm's growth pattern in the study when we plot the number of firms versus firms in the year, then the graph formed is shown in Figure 6. In the study area the firms are in a growing pattern in the study time period.

To elucidate the growth process, following Arbia's framework (1996), the N_t existing firms at time t can be categorize the into K dimensional classes. Within this categorization, further defining u_{ik} as the coordinates of the i^{th} firm belonging to the dimensional class k (where k ranges from 1 to K). With the consideration of the first m_k ($i = 1, \ldots, m_k$) firms in dimensional class k as continuing to operate at time (t + 1), while the remaining $n_k - m_k$ firms ($i = m_{k+1}, \ldots, n_k$) are assumed to cease their activity within the time interval (t, t + 1). Also, introduce $D_{ik,t}$ to represent the dimension of the i^{th} firm belonging to dimensional class k at time t, and $Y_{ik,t}$ as a measure of the growth of the i^{th} firm within dimensional class k between time t and time t + 1. For instance, $Y_{ik,t}$ can be defined as $(D_{ik,t+1} - D_{ik,t})/D_{ik,t}$, but other definitions are also plausible.

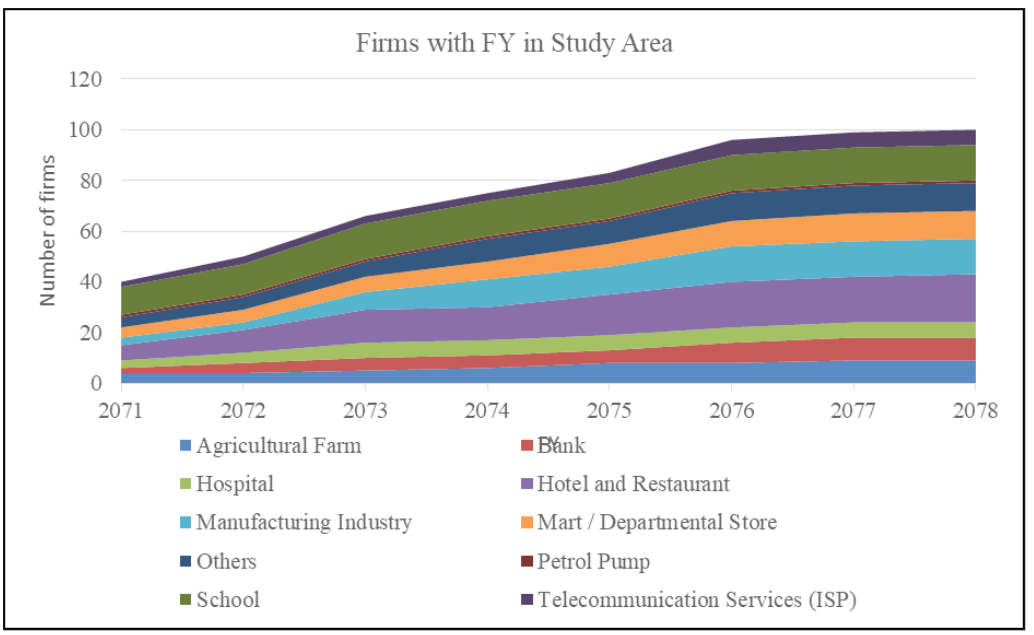

Figure 6: Firms with year of establishments showing growth of firms

The proposed model characterizes spatial growth, $Y_{ik,t,}$ as a function of several factors. These factors include the firm's stage of development, its exposure to external sectoral shocks, the variable returns (positive or negative) derived from its proximity to other existing firms, and a set of explanatory variables. This comprehensive approach allows us to analyze and model the spatial growth dynamics of firms in a multi-dimensional context. More formally we have:

Equation 8

$$Y_{ik,t} = \alpha_{i0} + \alpha_{i1} D_{id,t} + \alpha_{i2} Y^* + \alpha_{i3} \mathrm{X} + \alpha_{i4} \mathrm{R} + \sum_{j=1}^{K} \gamma_{ij} W_{tj}(u_{ik}) + \varepsilon_{ik}$$

In the equation above, which builds upon the earlier notation, as $\alpha = [\alpha_{i0,} \alpha_{i1,} \alpha_{i2}, \alpha_{i3}, \alpha_{i4}, \gamma_{i1}, \ldots, \gamma_{ik}]$ as a set of parameters that require estimation. Additionally, $W_{jt}(u_{ik})$ represents a measure of the interaction intensity between firm i, belonging to dimensional class k, and its geographical neighbors in dimensional class j. The ε_{ik} terms represent independently and normally distributed noise components with a mean of zero and finite variance. These components account for random variations in the model and add statistical robustness to the analysis.

Hence, from the above equation 8, the researcher performed and estimates the value of variables with some assumptions depending upon the study area and some statistical calculations. For the Growth process researcher used the same model with simplifications. But of course, need the data of existing firms with main roads, communication networks and other significative points.

Building upon the findings from the 2022 survey, a distinct growth trend became evident among firms with shared characteristics within the Kirtipur municipality, The data unveiled that the initial count of firms stood at 39 in the year 2070. Subsequently, a remarkable surge unfolded, witnessing the addition of over 61 firms during the interval spanning 2071 to 2078. This cumulative momentum culminated in a total of 100 firms by the conclusion of this period. Moreover, a significant revelation emerged upon dissecting the growth trajectories of various firm types throughout the study period. Notably, while calculating in percentages, manufacturing industries emerged as a standout, experiencing an extraordinary expansion of 366.7%. This remarkable growth rate positioned manufacturing industries as the most rapidly flourishing category. Following closely, the banking sector exhibited noteworthy expansion with a growth rate of 350%. In contrast, the sectors displaying the least pronounced growth were petrol pumps and schools, each exhibiting growth rates of 27.3%, respectively, highlighting a more modest advancement in comparison.

Conclusion

In conclusion, the research titled "Modeling on Spatial Economic Activities: A Case Study of Kirtipur Municipality" meticulously explored the intricate landscape of spatial micro-econometrics within the municipality. The study has opened out the needlepoint of firm establishments, encompassing their birth, growth, and survival patterns. The study's findings have illuminated the ascending path of firm establishment trends, notably concentrated along accessible roadways. The birth modeling analysis exposed a negative correlation between distance from main roads and new firm locations, aligning with theoretical expectations of ease in resource access. Examination of firm survival patterns illuminated operational diversification, while growth analysis underscored the exceptional expansion of manufacturing industries.

Through a numerical example based in Kirtipur Municipality, the researcher demonstrated the model's potential for dissecting geographic economic concentrations, tracking firms in space, and evaluating regional aspects without arbitrary geographical constraints. The generation of the economy merely depends on firms' establishments, growth, and survival which depends on the development of infrastructure, telecommunication, availability of raw materials, labor etc. Following the survey and in-depth analysis of the collected data, it becomes evident that the growth, survival, and birth of firms in the study area are primarily influenced by several key factors. These include the ease of access, efficient of raw materials and manufactured goods, and the availability of labor resources. Moreover, the interaction between the location of new firms and the proximity to previously established firms play a significant role. This interaction results in a higher probability of new firms being located in close proximity to existing ones, which reflects the presence of positive spatial externalities, a common characteristic in many economic geographic contexts. In essence, this research enriches our comprehension of Kirtipur's economic dynamics, unravelling insights into firm behaviors and the spatial dynamics shaping them. It underscores the potential of microeconomic data-driven models in elucidating complex economic phenomena.

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