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DISTANCE AS KEY FACTOR IN MODELLING STUDENTS' RECRUITMENT BY UNIVERSITIES

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ABSTRACT. – Distance as Key Factor in Modelling Students' Recruitment by Universities. In a previous paper analysing the challenge of keeping up with the current methodologies in the analysis and modelling of students' recruitment by universities in the case of some ECE countries which still don't register or develop key data to take advantage from the state of the art knowledge on the domain, we have promised to approach the factor distance in a future work due to the extent of the topic. This paper fulfill that promise bringing a review of the literature especially dealing with modelling the geographical area of recruiting students of an university, where combining distance with the proximate key factors previously reviewed, complete the meta-analysis of existing literature we have started a year ago. Beyond the theoretical benefit from a practical perspective, the meta-analysis aimed at synthesizing elements of good practice that can be applied to the local university system.

Keywords*: university recruiting, distance modelling, recruiting area, higher education marketing, recruiting modelling*

1. INTRODUCTION

The obviously growing inter-university competition in student's recruitment clearly stimulated the research literature on student recruitment. Usually the studies focus on the demand for education and enrollment dynamics characteristics, the student's profiling of some universities and changes in demand, universities policies linked to the dynamics of state educational policies. A considerable number of studies focus on geographical areas of student's recruitment. The analysis of the spatial and volumetric changes of geographical areas for recruitment, of the cost-benefit ratio (tuition fees, the scholarship offered and the quality of the university), the socio-demographic variables of students recruited comparing them to the demographic characteristics of area of origin remain the main topics of those studies. A rapid development had the studies on areas for recruiting students from 90's decade after development registered by (Arc)GIS as a tool for analysis and processing data, although field studies that take into account the spatial dimension were early (60'sand 70's decades) and thematically diversified (see Schöfer, 1975, with implications of the

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C*entral Place Theory* in assessing the level and the strategic location of the institution, and also the gravity model in shaping students' preferences).These developments allowed the spatial relationship modelling and plot a lot of data, collating data on enrollments of the university or higher aggregate entities with existing census data on the stock of general population and its characteristics. In a previous paper (Mălăescu, Speranza, 2013) analysing the challenge of keeping up with the current methodologies using (Arc)GIS in the analysis and modelling of students' recruitment by universities in the case of some ECE countries, we have analysed several factors shaping the student recruitment area configuration such as *reputation, prestige* and *financial policies regarding tuition and scholarships offered, district data on school population* and *student status* variables such as *age, gender, type of education, level of study, outcome* and *postcode*. Due to the amount of studies taking into consideration and modelling the factor *distance from the place of residence of the student* in shaping the student recruitment area configuration of the universities we have promised to approach this factor in this future paper.

2. "*THE PROXIMITY EFFECT*" VERSUS "*UNIVERSITY OF CHOICE*" IN MODELLING STUDENTS' RECRUITMENT BY UNIVERSITIES

As expected, the first factor investigated by the expert studies, more than three decades ago, and, at the same time, intuitively the most obvious variable, which matters for explaining the variance of decision on enrolling in the university –*distance* – currently, remains the key factor statistically highlighted by expert studies. Alm and Winters reconfirm, that, at the level of 2009 as well, the most important indicator of the variability of the number of recruited students, apart from the sublimated traditional factors (hidden, already integrated) in *cost-benefit ratio* (*tuition fees, the scholarship offered and the quality of the university*), is represented by *distance to the place of residence.* The results of their study highlight the dramatic decrease in number of recruited students as the distance from the university increases gradually. But, this decrease occurs unevenly, the outcome being very different from one state to another and also depending on the type of higher education institutions – the most elitist ones having a larger recruiting area, fact which comes as a confirmation of the previous results (Viterio, 1989 in Alm and Winters, 2009).

J. Spinelli' s study (2000), using GIS in analysing data, explains the variance in students' choice of the universities as follows: the geographical distance represents the most important factor that dictates the choice (what the authors label as „*the proximity effect"* (Spinelli, 2000; Smith, Spinelli and Zhou, 2002, p.35)), followed by the *universities status* (90%); the university statute matters the most when choosing the university – situation labelled as *"university of choice"* (Spinelli, 2000; Smith *et al.*, 2002, p.35) – in 50% of the situations. Other factors such as *the highest level to which graduation diploma are offered, universities reputation and their prestige,* as well as *the statute (private versus state/ state-assisted)* slightly modulate the results (factors that are also brought into attention in Smith *et al.,* 2002). On the basis of the gravity model, McConnel (1965, in Smith *et al.*, 2002) and Kariel (1968, in Smith *et al.*, 2002), have

highlighted, even since the 60s, the importance of the volume of population being of appropriate age for enrolling in the university and distance, as key factors in designing recruitment areas. Using a representation method based on GIS, in distance bands of recruitments (resumed with modifications in Smith *et al.* (2002)), Spinelli (2000) has assigned concentric circles around Ohio universities ranging between 0-32 km, 33-64 km, and 65-97 km, respectively. Based on evaluating the band in which an administrative unit is situated and also on assigning the distance to the central city of the administrative unit, several situations have been emphasized:

- *Universities from large urban agglomerations* – which recruit their students form these important urban demographic areas and generally attract students from within the 0-32 km distance band.

- *"Commuter universities"* are considered to be those institutions that draw over 70% of their enrollees from outside their administrative units. These ones record a decrease in enrollment once the distance becomes greater at the level of each band (Smith *et al.,* 2002).

- *"Rural commuter university"* is the label for those situations in which the university under discussion is located outside a major urban center – a relevant example in this respect being Shawnee State University which is not situated within an urban center and where 82% of the students are recruited from the local administrative unit. In some cases, such "rural" universities attract more students from the larger area (the 64 km one), than "commuter universities" (CU), being considered *"regional universities"* as a consequence. These are less affected by the distance regarding enrollments (Smith *et al.,* 2002). In the case of CU, geographical distance is, at its turn, the one that dictates the size of recruiting area and the distance band.

The simple representation of enrollment figures by districts in the case of Ohio universities, carried out by Smith *et al.,* (2002) highlights, at the level of 2002 study as well, the proximity effect, the representation and the analysis in distance bands of the intensity of recruitment (the second method used in the two studies), fact that brings to the fore the same importance of geographical distance, but with subtle differentiation as compared with the study carried out by Spinelli in 2000. The attention is drawn upon the importance of university being in spatial proximity to *major urban centres*. Smith *et al.* (2002) also suggest the introduction of other indicators such as: the competence in offering high-level diplomas, reputation, prestige, the statute of state-assisted universities versus private universities.

Three types of exceptions to the proximity effect are highlighted in the study of the authors (Spinelli, 2000; Smith *et al.*, 2002):

- situation in which two universities that are in competition for recruiting students are located close to each other (the authors exemplify with Butler County situation where 37% of the students choose an university in their local area, enrolling at Miami University, while 35% go to University of Cincinnati, situated within proximity (Hamilton County);

- situation in which two non-contiguous administrative units are situated at long distances from a state-assisted university, and, as a consequence, students choose between state-assisted universities and private universities;

- situation in which a mission stated by the university comes into action, which nuances school option patterns imposed by distance (in the case under analyse by the author, the ethnic diversification of central state-assisted university).

Johns (2002 quoted in James, Baldwin, Coates, Krause and McInnis, 2004, p.27) proposes the taxonomy of seven classes in the case of areas of origin used in Australian system recording the enrollment in the university. This classification would be achieved depending on the geographical area of residence in order to observe the remoteness and isolation characteristics by reference to an university center (used in assessing the equity of access to higher education) arguing that the current system, based on postal codes needs improvements (codes are subject to modifications etc.): metropolitan (with two subcategories: *the capital* and *big cities)*, provincial (with the subcategories: *major provincial center, small provincial center and others), provincial* and, respectively, remote with subcategories: *remote* and *very remote*. The benefit aimed at by the study of James *et al*. (2004) is represented by the potential university programmes better focused on the beneficiaries, on a certain target group of beneficiaries. James *et al.*(2004) argues that measuring the distance from the campus proposed by Western *et al.*(1998) (quoted in James *et al.,* 2004) with the categories*: long, medium* and *short* is inadequate, because, on the one hand, people living in proximity to a single regional university center, have limited forms of access and *limited possibilities to choose in matters of fields of interest and enrollment possibilities*, and on the other hand, the taxonomy based on proximity is based on the assumption that distance represents the main cause generating lack of favorability. The authors quote the report by Stevenson *et al*. (2001) in support of the statement that reality is not supportive in this respect. The above-mentioned study proves that the differences regarding the distance from one campus to another play a minor role in the participation patterns in higher education because the factors that really differentiate the participation according to the backgrounds (rural/urban) are the value placed on having an higher education degree among isolated rural communities "significantly heightened by the additional costs of attending university" (James *et al.*, 2004, p.27).

C. Hanewicz (2009) has employed students' address data to find out if spatial analysis reveals geographical differences among those students who used to withdraw, remain enrolled or successfully graduate from Midwestern and Western University, after six years of study. It has been revealed, in the study, the fact that distance has not been relevant in the differentiations between the drop-out group and those who completed their studies, but spatial proximity from university has been important for those who were and remained in the system. However, GIS may be used in identifying new off-campus locations as close as possible to large pools of students.

Alm and Winters (2009) have carried out a review in which they have also mentioned other early studies that have highlighted distance: Gossman, Nobbe, Patricelli, Schmid and Stear (1968, with an elasticity between -1,5 and -2.0), McHugh and Morgan, 1984 (elasticity of -1,3), McConnell (1965), Kariel (1968), Ullis and Knowles (1975), Leppel (1993), Ordovensky (1995), Desjardins, Dundar and Hendel (1999); Ali (2003). Previous studies have focused on the relationship between distance and other factors such as: *age, ethnicity, and social class* regarding enrollment patterns and

the necessity that universities should take into account these factors in their marketing strategies and their initiatives of enlarging participation (Farr, 2001 quoted in Read, Higgs and Taylor, 2005) and should consider the role of geography in the process of recruiting and retaining students (Croot and Chalkley, 1999 in Read *et al.*, 2005).

3. THE GRAVITY MODEL USED IN MODELLING STUDENTS' RECRUITMENT

Alm and Winters (2009) have employed the gravity model of students' mobility for estimating the elasticity of enrollment demand at the level of university system in the state of Georgia, where the determination of student migration flows has been achieved on the basis of the population from the area of origin, population of the area of destination, the distance between origin and destination and a certain number of attraction and rejection factors. Ayad (2007) has quoted a series of authors (Huff, 2003; Marting, 2001, Martin, 2002, Dramowicz, 2005) who have employed gravity model for estimating the probability of a student being attracted towards a certain university using the applicability of the model in marketing studies (aiming at the same probability in the case of a potential customer situated between two shopping malls, who travels to one of the malls considering the model of utility of each of them and the travelling distance). In this case the gravity model, according to Ayad (2007, p.10), is represented as follows:

$$I_i = G_i \times \frac{NSATi}{Di\ 2}$$

Ayad (2007) used the gravity index (I) calculated for every school district (i), emphasizing the weigh for every school district (i) counting on the number of college-bound students (NSAT) in the concerned school district and the corresponding distance (D) to the university that is subject to analysis. Variable *G* is emphasizing the impact of other factors such *as the targeted median household income* or a certain *average performance* based on *average SAT score* in the designated school district (i). On the basis of this formula, a district with a high number of SAT takers and which is situated at short distance from the university will receive a higher weight than a remote one with fewer SAT takers (Ayad, 2007).

For measuring the distance, the actual driving distance to the university has been employed. Data regarding the enrollees have been represented by using SAT (ox) and the average median household income (oy). Ayad's (2007) study highlights the fact that the number of *college-bound students (SAT takers), the median household income* and *the distance to the university* play an important role in influencing the results of students' recruitment. The author claims that, although there are opinions according to which in certain situations the potential students prefer to travel, in the case of Clarion University (Pennsylvania) the distance proved to be a limitation regarding the number of enrolled students. The recommendation of increasing the number of scholarships or *the offering of some incentives for those recruited from long distances* might be a solution in this case. The *median income* factor is more or less important depending on the target group. *SAT,* also represents a factor whose importance in the formula should have more weigh if the objective is a qualitative improvement of the group of students.

Alm and Winters (2009, p.730) use the formula:

$$M_{ij} = AijP_j{}^{\alpha 1} P_j{}^{\alpha 2} d_{ij}{}^{\beta}$$

Where P_j represents the student population from the institutions in district (i) (area of origin); P_j represents student population from institution j (area of destination), d_{ij} represents the distance i-j, $Aij = \Pi_k(z^{\gamma k}{}_{kij})$ represents a multiplicative term that allows the inclusion of variable k that measures *"push" factors* of the institution within district and "pull" factors Z_{kij} which impact on student migration, and γ_k, $\alpha_{1,}$ $\alpha_{2,}$ $_{\beta}$ are the parameters.

The results of the quoted study highlights the fact that increasing distance to the nearest college determines the decrease in the probability that a graduate would enrol in any regional or state institution (elasticity of -0, 12) or, at least, there is a decrease in the probability that the student would enroll in college (increasing thus the probability to enroll in an university), while the increasing distance to the nearest university does not determine any impact on the probability of enrolling in any regional or state university. Once taken, the decision to enroll in the training system following upper-secondary education, future students could choose between universities and colleges. In the situation when colleges offer study programmes of lower qualitative standards, specialists designing strategic policies encounter the following dilemma: *increasing the accessibility to colleges* generates two categories of consequences: *the number of students enrolled in the system increases and on the other hand, a large number of students who would have enrolled in the universities are taken over by colleges*. On the contrary, in the case of universities, a higher degree of accessibility will not bring more enrolled students in the system, but will increase the qualitative level of those attending the university.

4 THE GAP IN DATA COLLECTION AND SPATIAL GEOCODING AVAILABLE IN THE CASE OF ROMANIA IN ORDER TO CATCH UP WITH THE GOOD PRACTICE METHODOLOGIES

In the case of the Romanian Higher Education System a different solution was carried out soon after the fall of the communist regime: the most prestigious universities with regional or even national recruitment area as a *university of choice* (Spinelli, 2000; Smith *et al.*, 2002) have opened several branches located in middle sized cities, in order to moderating *the proximity effect* (Spinelli, 2000; Smith *et al.*, 2002).

The universities branches offer the same academic programs and graduate diplomas as the core-center university and are usually located in the main urban center of the administrative unit (county). Prospect students still have to choose between universities' branches by the reputation of their training programs and still having the option to go and study in the main university center (see the case of Babeș-Bolyai University direct recruitments compared by the number of students studying in its academic extensions in figure 1). Although the total amount of students choosing Babeș-Bolyai University is gradually decreasing with the increasing of the distance to the place of residence, the number of students choosing to study in an academic extension is not increasing. For some of the administrative units near Cluj-Napoca (like Bistrița Năsăud for example) the number of students choosing to follow the university's academic programs in their home

town is not necessarily explained by the distance. This configuration is leading to the conclusion that recruiting models wich take into consideration a greater number of factors will better aproximate or explain the present situation as revealed by the pilot study conducted in 2013.

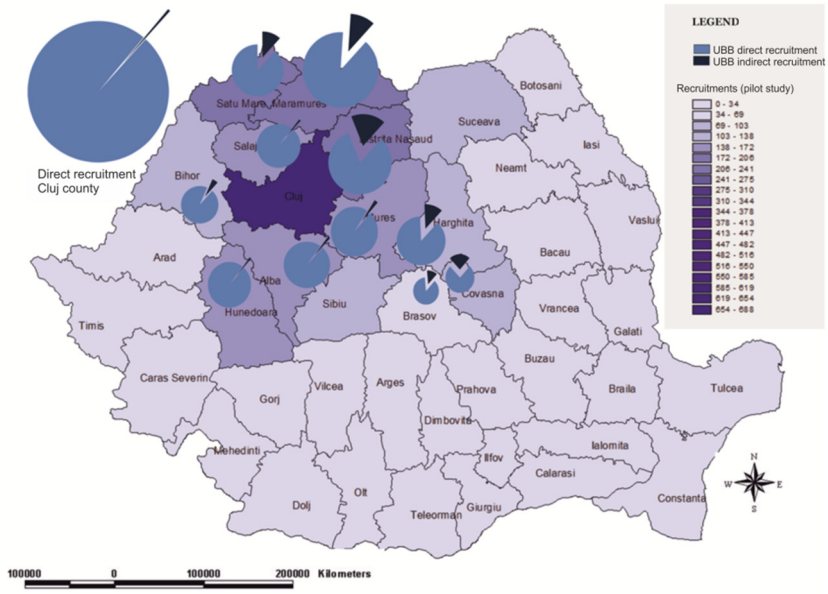

Fig. 1. Direct and indirect recruitment (throughout academic extensions) in the case of Babeş-Bolyai University (bachelor level, pilot study, 2013)

In a previous study (Mălăescu, Speranza, 2013) stressing on the difficulties and the constraints that countries such as Romania have to deal with in order to chatch up with the use of current methodologies used in student recruitment modelling we have presented the type of geographycal data on the students recruited that universities such Babeş-Bolyai University, used to collect before the application of the Ministerial Order No. 164/13.03.2012 (requiring collecting a much larger number of data on students enrolled from admitted candidates). Even if declaring the home address (street and number) is mandatory now according to the M.O. 164/2012 for all students enrolled in university, the pinpointing of the addresses is still something to reach for due to the incomplete representation of the entire national space allowing automatic mapping using GIS based on the geocoding of each of the recruited students. Considering the pilot study of 2013, the first year after implementing the M.O. 164/2012, the amount of not declared data on address is also considerable. Considering these limitations the more refined variable processed in order to give a spatial image of the geographical recruitment area of an university is still the "county" (the middle-level administrative unit).

The benefit of spatial approaches focused on the use of GIS in educational marketing is in mapping and analysing participation rates in relation to specific recruitment campaigns and expansion strategies for identifying changes in enrollment patterns or the shaping of profiles of certain areas in terms of students recruited, in order to develop a range of courses designed to be attractive to that segment of the market area (Read, Higgs and Taylor, 2005). If for several decades higher education marketing has concentrated on how to attract a certain type of student for its academic programs now the paradigm is shifting to design the matching academic program for the needs of a particular area with a socio-economic profile.

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