"Utilizing Location Intelligence for the Placement of Corporate Services"

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1. Introduction

Understanding the optimum locations in which a business operates is becoming an important component for success in an increasingly competitive global economy. Applying location analytics can lead to a more effective definition of natural markets (Birkin et al. 2001, Harris et al., 2005) and a better understanding of the optimal locations from which to operate a business or provide back-office services based on key indicators of the business ecosystem (Figure 1).

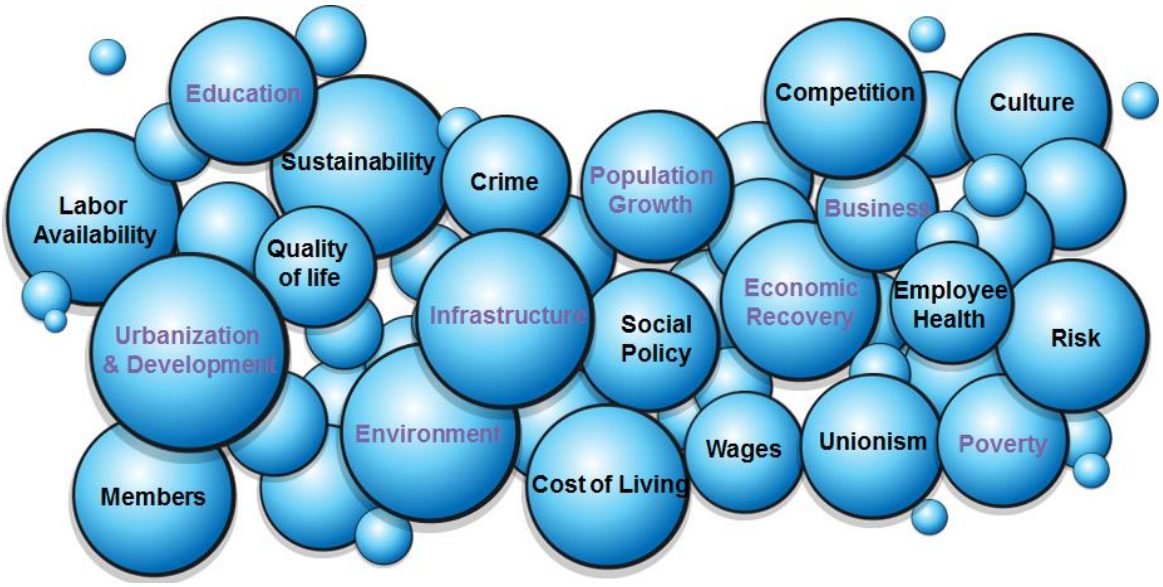


Figure 1: The business ecosystem consists of one or more key indicator that affects the operational success of a company.

The business ecosystem is an interconnected matrix of direct and indirect influences to be considered when selecting a location, such as the business culture, lifestyle, labour, healthcare, cost of living, crime, economic climate and education. The goal of most commercial real estate transactions is to select the best "geographies of opportunity" through a fit-to-purpose spatial analytical discovery process. This process for selecting the optimal location that supports workplace success by enhancing business processes is called location intelligence.

The aim of this research was to investigate new ways of working in commercial real estate. An empirical approach was adopted and the findings from case studies drawn from the authors' work in the USA are presented in this paper. As such, the objectives were to develop, implement and evaluate methods to support strategic decision-making by applying location intelligence to real estate transactions.

Real estate-related searches in the US on Google have grown more than 250 percent in the past four years, and 90 percent of house hunters now look online, according to a recent report from the National Association of Realtors (Zeveloff 2013). As a result, the demand for real estate decision support technology is growing. Corporate boards are now requiring the utilization of data and technology to mitigate risk and validate their location decisions, which is driving methods for the practice of location intelligence. Whether it is avoiding crime hotspots when searching for a home, targeting customers for a retail service or identifying the availability of labour to run a business, location intelligence offers considerable appeal to analyse and improve various business processes.

Real estate companies utilize mapping and GIS to promote their services. Even though most of these companies use the technology for visualization, there has been a shift toward using spatial analysis to select and promote real estate opportunities. GIS systems are helpful in site selection. As noted by Gibler *et al.*, (2010), MapInfo and ESRI ArcGIS Desktop have been the primary site selection tools for displaying data in map form and have developed

algorithms that can be used to identify locations that optimize markets based on key indicators.

Whilst there are well-established approaches for using GIS in residential real estate management its' role in commercial real estate and support for back-office business processes are less well documented.

2. From location theory to location intelligence

Von Thunen's location theory addresses the questions of what economic activities are located where and why. It is concerned with the geographical location of economic activity and has become an integral part of economic geography, regional science and spatial economics. Location theory rests on the assumption that firms choose locations that maximize their profits and individuals choose locations that maximize their utility. 'New economic geography' emphasizes how firms tend to cluster together, and regions with similar - or even identical - underlying characteristics can turn out to be very different (Ottaviano and Puga, 1997).

In today's business ecosystem, Von Thunen's model of exceeds one series of concentric rings for identifying the right market for business and financial operations. Today market analytics must consider a macro and micro approach to identifying an optimum location that considers agglomerations within markets which suggests multiple locations with concentric rings representing different industries connecting together.

Commercial site selection has historically been a reactive process (Buckner, 2004). Corporations and service providers would ask real estate companies to help select new locations based on two key factors, expansion or consolidation. The paradigm for decision-making has shifted with companies wanting more detailed market and business intelligence. As noted by Davenport, there is a demand for an increase of speed for data and analytical models that are embedded into operational process to enhance more accurate location decisions (Davenport, 2013).

3. Case Study: locating a campus for technical training

Universal Technical Institute, Inc. **(**UTI**)** is a provider of technical training for students seeking entry-level positions as automotive, diesel, collision repair, motorcycle and marine technicians (UTI 2014). The for-profit company is based in the United States and operates 11 campuses in 8 states. In 2013 UTI retained JLL (JLL) to locate a new campus in the New York metropolitan service area. JLL is a financial and professional services firm specializing in commercial real estate services and investment management. It was established more than 200 years ago and has grown to employ more than 40,000 real estate experts in 1,000 locations in 70 countries. The organization delivers integrated commercial real estate services built on insight and foresight, market research and local knowledge. A valuable asset held by the company is its' spatial data. This combines government data, licenses to use commercial data sets and the results of numerous bespoke surveys.

UTI students are predominantly young males and these attributes {age, gender} were combined with median family income in a site selection model. Unlike analytical models that might rely solely on demographics JLL adopted a psychographic – or behavioural - segmentation to provide greater accuracy in identifying clusters of potential students with a propensity to attend industrial training. In this case the commercial Tapestry Segmentation

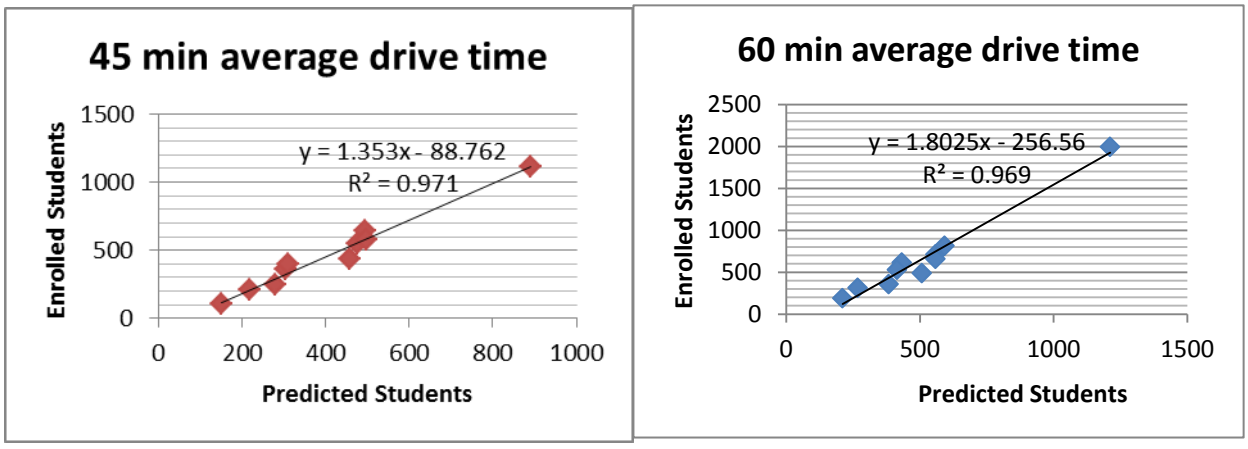
data were used (ESRI 2013). Tapestry Segmentation classifies US neighbourhoods into 65 distinct market segments. Neighbourhoods with the most similar characteristics are grouped together, while neighbourhoods showing divergent characteristics are separated, thus mirroring the concept of 'natural neighbourhoods' (Gearey, 2006).

The first step was to geocode the addresses of UTI students who had enrolled at any of the UTI campuses in 2013 and locate their neighbourhood. The Tapestry segment for that neighbourhood was then identified and the frequency of students in each segment calculated. These frequencies were used to calculate penetration rates. A model to predict an enrolment using the penetration rates was applied to existing UTI and the results compared to actual enrolments (Table 1).

Campus Address	Actual enrolments		Predicted enrolments	
	45 Min Drive Time	60 Min Drive Time	45 Min Drive Time	60 Min Drive Time
Van Buren & 107 Ave, Avondale, AZ	459	507	434	490
721 Lockhaven Dr, Houston, TX	475	558	544	713
601 Regency Dr, Glendale Heights, IL	494	592	644	816
Haven Ave & 6th St, Rancho Cucamonga, CA	890	1211	1118	1996
750 Pennsylvania Dr, Exton, PA	305	432	363	615
4100 Duckhorn Dr, Sacramento, CA	281	383	249	359
220 Byers Creek, Mooresville, NC	152	210	103	191
One Upland Rd, Norwood, MA	311	414	394	530
9751 Delegates Dr, Orlando, FL	219	267	207	314
5151 Regent Blvd, Irving, TX	497	558	580	660

The model accounted for 97% of the variation in enrolments using either 45 or 60 minute drive time catchments and the distribution of residuals was homoscedastic about the linear regression line (Figure 2).

Figure 2: Predicted and actual enrolments at UTI campuses in 2013



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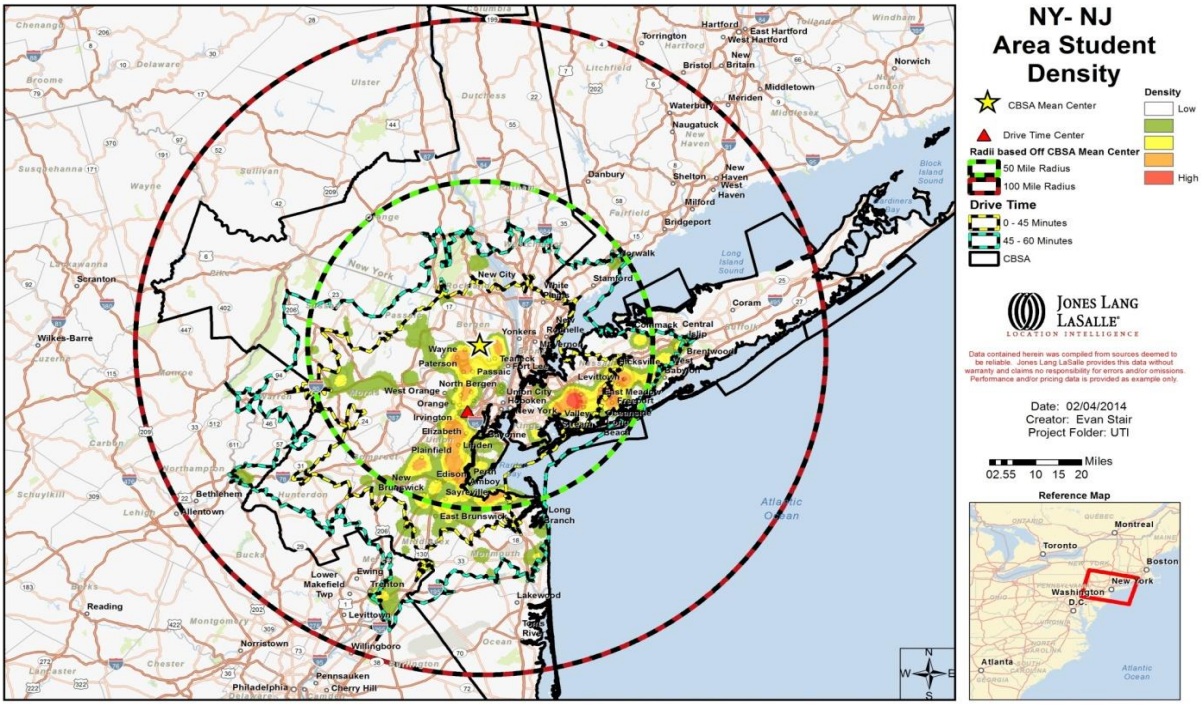
Once validated, the model was used to estimate the number of students who would enrol from each neighbourhood in New York State. A heat map was created for the New York metropolitan area thus providing a visualization of the opportunities for locating the new school



Market	Pop Per MSA		CBSA	45 Min Drive Time	60 Min Drive Time	50 Mile Radius	100 Mile Radius
New York / New Jersey	19,764,907		1571	1049	1278	1203	1915

Figure 3: Density of predicted student enrolments in New York – New Jersey and distance-based and drive-time catchments from o ptimal campus location.

3b. Case Study: relocating a back office service

Yahoo, an American multinational internet corporation, provided JLL with a labour matrix representing the anticipated full employment of a new facility. For this study, JLL measured the relative strengths of the workforce in potential locations using a macro model to assess markets in the Pacific and Mountain time zones. Further, only markets with 100,000 in labor force were measured. The top 10 markets were established.

1. Yahoo answered a questionnaire that pointed to its own custom indicators from the business ecosystem.

2. ESRI software was utilized to mine the data representing the key indicators at the US census Core Based Statistical Unit - this geographical unit delineates major markets in the US.

3. The data was normalized and an index was created to compare markets

			Talent 40%					Cost of doing Business 40%				Corporate Culture 20%			
Rank	Market	State	Labor Availability	Educational Attainment	Workforce Sustainability	Tech Savvy Workforce	*Talent Index*	Cost of Labor	Cost of Living	Tax Environment	*Cost Index*	Legal Environment	Quality of Life	*Corporate Culture Index*	*Location Index2*
1	Boulder/Denver	CO	131	181	134	191	159	85	84	116	95	99	113	106	123
2	Olympia	WA	168	143	146	124	145	91	88	148	109	92	100	96	121
3	Salt Lake City/ Ogden	UT	127	124	149	116	129	102	101	131	111	121	99	110	118
4	Bremerton-Silverdale	WA	93	139	143	149	131	102	89	148	113	92	108	100	118
5	Bellingham	WA	150	124	132	96	126	102	83	148	111	92	118	105	116
6	Spokane	WA	146	128	114	90	120	98	100	148	115	92	108	100	114
7	Las Vegas	NV	75	88	150	80	98	96	91	150	112	137	85	111	106
8	Seattle-Tacoma-Bellevue	WA	116	140	106	82	111	85	70	148	101	92	110	101	105
9	Phoenix	AZ	125	93	107	129	114	93	93	96	94	96	110	103	104
10	Kennewick-Richland-Pasco	WA	88	97	106	105	99	94	93	148	112	92	98	95	103

1. An index value of 100 represents an average using the US as a geographic al base.
2. Index Scale Red: 0 – 90 **(RISK)** Yellow: 91 - 119 (Neutral) Green: 120+ (Opportunity)

Figure 4: Results of multiple key indicators chosen to measure markets for business

4. Using a secondary data source from Chmura Economics & Analytics we validated the top ranked markets that had sustainable available labor which is the highest operating cost for any corporation.

What-If Report for Boulder, CO MSA, NAICS 5614 - Business Support Services, Firm Size of 100

Soc Code	Title	New Employer Demand	Current Empl	Current Unempl	Regional Avg Wage	National Avg Wage	Empl Ext	Unempl Ext	Potential Candidate / Opening Ratio
43-4051	Customer Service Representatives	25	2,738	173	$35,100	$33,100	3,407	243	116

Table 2: Model from Chmura Economics & Analytics used to validate ranking

4. Discussion

The aim of this research was to investigate new ways of working in commercial real estate. An empirical approach was adopted and the findings from case studies drawn from the authors' work in the USA are presented in this paper. As such, the objectives were to develop, implement and evaluate methods to support strategic decision-making by applying location intelligence to business processes in the real estate sector.

As stated by Fugita (2012), von Thünen's concentric ring theory relates to important theoretical findings of the New Economic Geography in the 90's: which was the development of transport technology as was thought to strengthen the agglomeration of economic activities. However, the use of location intelligence by global corporations expands upon the concept of a concentric ring focused on any one indicator and in fact points to the ability to assess an entire ecosystem of complex industry agglomerations. As shown in the case studies, recent applications of location intelligence within the real estate industry point to this assertion.

In the first case, it was noted that there is evidence that supports using location intelligence to predict the number student enrolments, which was at the upper limit of the range of

enrolments used to validate the model. In this model we determine the location of a cluster of students, which have a propensity to attend UTI for technical training. Further these clusters in many cases offer more than one location inside a market. In the second case study we also show how location intelligence, based on custom indicators, can identify the right location to find sustainable labour.

Evidence presented in both case studies, show that US markets have evolved into natural areas comprised of the supply and demand of people and services creating complex industry agglomerations that can be understood and navigated using location intelligence. This approach by real estate companies demonstrates that there is an evolution from Von Thunen's concentric ring theory to location intelligence.

5. Conclusion

Whether it is a retail service, a training school or a headquarters, corporations are relying on location intelligence for selecting the optimal location to support workplace success and address a variety of business and financial objectives. While there is demand for this type of analysis in business, more research will need to be completed to develop best practice with location intelligence.

References and Citations

BIRKIN, M., CLARKE G.P., CLARKE, M., 2001, GIS for business and service planning, Chapter 51 in Longley, P.A., Goodchild, M.F. , Maguire, D.J., Rhind, D.W., (Editors) *Geographical Information Systems: Principles, Techniques, Applications and Management*, 2nd Edition, pp 709-722.

BUCKNER R. W., 2004, *The science of site selection: using technology to effectively plan real estate strategies*. (New York: MapInfo Corporation).

DAVENPORT T. H., 2013, *Analytics 3.0.* http://hbr.org/2013/12/analytics-30 URL last visited 13/03/2014

ESRI, 2013, *Methodology statement: Esri data – Tapestry segmentation* http://www.esri.com/~/media/Files/Pdfs/library/whitepapers/pdfs/esri-data-tapestry-segmentation.pdf URL last visited 13/03/2014

FUJITA M., 2012, Thünen and the new economic geography, *Regional Science and Urban Economics*, 42, pp. 907 -912.

GEAREY W., 2006, *Towards a model for defining and assembling areal units to support health research using Geographical Information Systems (GIS) technology*, PhD thesis, Coventry University.

GIBLER K.M., GIBLER R., ANDERSON D., 2010, Evaluating corporate real estate management decision support software solutions, *Journal of Corporate Real Estate Management*, 12, pp. 117 – 134.

HARRIS, R., SLEIGHT, P., WEBBER, R., 2005, *Geodemographics, GIS and Neighbourhood Targeting*, New York: Wiley.

HOWSER T., 2012, Micro-Targeting with the Updated Tapestry Segmentation Data on the Community Analyst API http://blogs.esri.com/esri/arcgis/2012/04/24/micro-targeting-with-the-updated-tapestry-segmentation-data-on-the-community-analyst-api-part-i-of-ii/, URL last visited 13/04/2014.

OTTAVIANO G., PUGA D., 1997, *Agglomeration in a global economy: a survey of the 'New Economic Geography'*, Centre for Economic Performance, LSE, August 1997 Discussion Paper No: 356, (London: LSE).

Universal Technical Institute, 2014, *About us*, http://www.uti.edu/experience-uti/about-us, [URL last visited 21/3/14]

ZEVELOFF J., 2013, *See all the players powering the real estate industry online*, http://www.businessinsider.com/real-estate-technology-companies-chart-2013-3#ixzz2vqvK7rJk, URL last visited 13/03/2014.

Biographies

Dr. Wayne Gearey *leads Location Intelligence efforts for Jones Lang LaSalle. Dr. Gearey has designed innovative location intelligence models and performed market analysis for national and international clients. As a Location Intelligence professional with an expertise in applied GIS, Dr. Gearey is uniquely qualified to understand population trends, the supply and demand of labor as well as general market and econometric indicators. Dr. Gearey works with clients to validate, consolidate and operate their real estate portfolio quickly and efficiently with location intelligence, lending confidence to costly strategic decisions Dr. Gearey uncovers geographies of opportunity and as a result brings business strategies into alignment with new location opportunities. He has worked with large corporations such as Microsoft, Travelers Insurance, Yahoo, Shell Oil, United Healthcare, HSBC as well as government services, education and healthcare providers.*

Dr. Nigel Trodd *is Director of the Environment, Hazards and Risk Research Group and Associate Head of the Department of Geography, Environment and Disaster Management at Coventry University. He has responsibilities for Applied Research, Business Development and Internationalisation. Dr Trodd brings 25 years research experience in the area of environmental remote sensing and GIS, including authoring 11 refereed journal articles and more than 30 conference papers or presentations and the successful supervision of 9 PhD students, 1 MSc by Research student, with 3 further research students in progress. His current research interests lie in the development of spatial data infrastructures to support environmental impact assessment (including petrochemical applications) and the application of geospatial technologies for the analysis and modelling of landscape dynamics and geophysical hazards. Dr Trodd started his academic career at Kingston University, London, developing the world's first undergraduate degree in GIS and went on to contribute to the successful development of the world's first MSc GIS by distance learning at Salford University. In between he taught at Wollongong University in Australia. His pedagogic interests lie in the areas of open and eLearning and building capacity in research methods.*

Amy Fobes *is the founder of geoCommunica. As a geo-technology marketing expert, she is connecting Fortune 1000 companies to the geo-social economy and driving revenue, even in a challenging and complex economic environment. She helps organizations win market share by achieving their operational and sales objectives with location intelligence. She has twenty years of experience in sales, marketing and business analytics with an emphasis on the education and promotion of intelligent decision making tools. Prior to forming geoCommunica, Amy worked at global leading companies such as ESRI and Sun Microsystems. As a result of Amy's innovative approach for designing geo-tech strategies, Amy is a sought out speaker on location intelligence and has spoken at various industry leading conferences.*