

Analysis of Real Estate Portfolio Diversification Performance across the Economic Specializations of Cities in South East, Nigeria.

Awa Kalu Nwojo^{1*} Ogbuefi, J. U.^{2*} Emoh F. I.^{3*}

1. Department of Estate Management, University of Uyo, Nigeria.

2. Department of Estate Management, Nnamdi Azikiwe University, Awka, Nigeria.

3. Department of Estate Management, University of Nigeria, Enugu, Nigeria.

corresponding author: Awa Kalu Nwojo

Abstract: Naively diversifying across the geographic region created by political or historical events has often been found not to be efficient and this has been the common practice by most real estate investors in South East Nigeria. The study was carried out to analyse the performances of real estate investment portfolios in South East, Nigeria when diversified across the economic specialization of the cities with a view to determine whether the strategy offers diversification benefits. Survey research method was used in the study. Structured questionnaire was used to collect data on the annual rents and capital values of residential and commercial properties from thirty one registered estate surveying firms in the study areas. Returns of the different classes of properties were estimated from the collected field data; Karl Pearson correlation analysis and mean-variance analysis were used to determine the efficiencies/benefits of real estate portfolio diversification across the economic specialization of the cities in South East States of Nigeria. The results of the analyses showed that the coefficients of the correlations of the properties across the different cities were predominantly weak and mixed with negative coefficients. Blocks of six number three bedroom flats and tenement roomy commercial blocks both in the CBDs and high density areas across the selected cities are recommended as preferred choices for diversification across the economic specialization of the cities as they respectively outperformed other classes of properties.

Keywords: real estate, portfolio diversification, economic specialization, residential and commercial real estate

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I. Introduction

Modern Portfolio Theory is an investment model that describes how a rational investor can use diversification to obtain optimal portfolio. It is a complete deviation from traditional security analysis by shifting emphasis from analysing the characteristics of individual securities that comprise the overall portfolio (Edwin and Martins, 1997). An efficiently diversified real estate portfolio maximizes the portfolio expected returns for a given amount of portfolio risk, or equivalently minimizes risk for a given level of return, thereby creating optimal investment performance. On the contrary, when real estate investment portfolio is naively diversified, it undermines the relevance of modern portfolio theory; thereby creating an inefficient portfolio. This ultimately results to poor investment performance.

Globally, it has been a traditional practice to diversify real estate investment based on geographic region that have been created by political or historical events or alternatively across different cities with the view that their location differences would likely create diversification benefits. Thus, geographical regions have been used by several studies to examine the benefits of geographical real estate portfolio diversification. This approach has been disputed by many researchers in recent times, who opined that real estate returns are determined to a great extent by economic factors that are not taken into account using traditional regional portfolio approach.

The concept of economic diversification is based on the fact that real estate returns of towns with similar economic characteristics may behave alike irrespective of their geographic distance because people tend to respond noticeably alike to the same economic condition. On the other hand, towns with different economic specialization patterns are characterized by different risk – return profiles. It is therefore believed that diversifying over towns with different economic profiles might provide greater diversification benefits in terms of risk and returns than diversifying over administrative regions that do not sufficiently reflect economic differences.

Contrary to the opportunities offered by the application of Modern Portfolio Theory, most real estate investors in South East States of Nigeria have over the years continued to naively diversify their real estate investment portfolios. This practice has often led to most investors concentrating their real estate investments either in a particular city or on a particular type of real estate investment across the cities or a combination of both strategies without proper understanding of the property market and the appropriate diversification strategy that meets the prevailing property market conditions.

This study was therefore carried out to analyse the performances of real estate investment portfolio diversification across the economic diversification of the major cities in South East States of Nigeria. The study was focused on residential and commercial properties located in the central business districts (CBDs) and high density areas of the selected cities.

1.1. Problem Statement And Justification

Observations have shown that in South East, Nigeria; most key real estate investors usually target at spreading their investments across the major cities in South East States of Nigeria in efforts to guard against risks and to optimize their investment returns. Conservatism and inaccessibility to in-depth knowledge on the applications of the tenets of Modern Portfolio Theory by the local real estate investors have continued to jettison the opportunities of exploiting the benefits of real estate portfolio diversification strategies. This has ultimately led to sub-optimal returns of a lot of real estate investment portfolios.

This study was therefore carried out to analyse the benefits of using economic specialization of the cities in South East States of Nigeria as basis for real estate portfolio diversification with the view to determine the benefits of the paradigm shift from the traditional naive diversification strategy.

1.2. General and Specific Objectives of the Study

The aim of this study is to analyse the benefits of the application of economic specialization diversification strategy of real estate investment portfolios in South East States of Nigeria. The specific objectives are to:

- (i) determine whether it is beneficial to diversify real estate investment portfolios across the economic specialization of the cities in South East States of Nigeria and
- (ii) determine the performances of different types of property when diversified in a portfolio across the economic specialization of the cities.

II. Literature Review

Conventionally, real estate portfolios are believed to be optimized by diversifying over administrative geographic regions that have been only created by political or historical events. These regions have been used by several studies to examine the benefits of geographic real estate portfolio diversification. However, this approach has been challenged in the past, as real estate returns are determined to a great extent by economic factors that are not taken into account using the traditional regional portfolio approach.

Thrall (2002) in his study indicated that regional real estate markets should be analyzed from an economic viewpoint, as their risk-return levels are mainly influenced by the underlying local economy. This requires that the economic specialization of a city in comparison to the overall economic profile of a country or continent has to be used as the basis for the definition of clusters containing those cities with similar economic characteristics

Mueller (1993), DiPasquale and Wheaton (1996), and Hoesli and MacGregor (2000) in their studies argued that real estate portfolios should be constructed based on an analysis of the economic characteristics of the city in which the properties are located. The idea is that geographic diversification strategies should be based on cities that differ in their economic characteristics and structures. This was further buttressed by Jackson (2013) who in his study identified that the administrative regions traditionally used to define the sub-markets are suboptimal, as the definitions are based on historical and governmental factors rather than on market fundamentals. He also found out that a more efficient way to devise a real estate strategy is to build the portfolio based on the clustering derived from discernable market drivers.

Heydenreich (2010) used annual office market data over the period from 1981 to 2003 to examine the benefits of economic versus traditional geographic (administrative) diversification in the United Kingdom (UK). Using annual employment data from Cambridge Econometrics, the author classified UK counties into 11 categories based on the level of specialisation in a number of counties relative to the national average. Then, using mean-variance analysis for different holding periods of five and ten years and for a number of sub-periods, Heydenreich compared the efficient frontiers produced by the 11 economic regions with the 11 standard regions of the UK as classified by the UK government. The author concluded that the traditional administrative regional approach to diversification yields inferior results compared to that produced by the economic regional classification.

The implication of this study is that Counties with similar economic specialization patterns were grouped together into economic clusters. Diversification over these clusters of different economic specialization gave superior diversification results. Of course, the success of this approach depends on the correctness of the assumption that locations with different economic characteristics are differently affected by changes in the environment (legal, economic, political, etc.).

Studies of the U.S. real estate market have shown that economic diversification can perform better compared to traditional diversification. Hartzell, Shulman, & Wurtzbaach (1987) in their study tested the effectiveness of dividing the US real estate market into functional regions instead of the four traditional (namely the East, the Midwest, the West and the South) which were commonly used prior to this study in the studies concerning geographic diversification in US. The data used in this study was return data from a large American real estate fund during the time period 1973-1987. The market was divided in eight regions based on underlying economic fundamentals according to a model developed by the Salomon Brothers. The effectiveness of strategies is tested by comparing correlation matrices. When correlation matrices were calculated for both the four-region and the eight-region strategy it turned out that the average correlation between economic regions was much lower than for geographical regions. This means that economic regions are superior to geographical regions from a diversification perspective. The authors therefore concluded that clusters of economic areas with different economic profiles lead to improve diversification results.

Shulman and Hopkins (1988) broadened the concept of economic diversification by analysing 60 standard metropolitan areas (MSAs) in their study, which they classified into homogeneous portfolios based on employment characteristics. These authors concluded that this classification should be superior to four- or eight-region diversification but did not provide a test of this hypothesis. An approach based on economic factors was also adopted by Corgel and Gay (1987) who investigated whether repayment risks of mortgages could be reduced. They divided employment data for the 30 largest standard metropolitan areas (SMAs) in the USA into eight industry groups, and did mean-variance portfolio analysis on the obtained time series. This analysis was found to outperform other diversification strategies not based on economic characteristics. For Europe, these findings were confirmed by Hartzell, Eichhaltz and Selender (1993) who characterized 74 commonly recognized European regions as diversified, or as specialized in one out of nine industrial categories. The regions with a common specialization were scattered throughout Europe, so regionally diverse investments were not necessarily economically diverse.

A formal test of the superiority of economic-based diversification strategies for real estate portfolio diversification was undertaken by Mueller (1993). Comparing correlation matrices obtained from the data collected for the study showed that economic regions are superior to geographical. To further buttress the importance of economic specialization of cities in real estate portfolio diversification performances, Roll (1992) in his study asserted that each country's industrial structure plays a major role in explaining stock price behaviour including real estate investment.

Mueller and Ziering (1992), in their study on real estate portfolio diversification using economic diversification tested the potential for risk reduction for different geographical classifications of the American property market. The classifications tested are the four standard regions; East, Mid-West, West and South, the eight economic regions created by Harzell, Shulman and Wurtzbaach (1987) and two additional classifications made for this study. The analysis of the correlation matrices showed that economic classifications were superior to geographical although less of the matrices for economic regions were statistically significant. The results for comparing efficient frontiers did not always point in the same direction, but in their conclusion, they asserted that the three economic regions were superior to the geographical regions.

III. Research Methodology

Survey research method was used in carrying out the study; the subjects of the study were residential and commercial properties in the central business districts (CBDs) and high density areas of the cities. Thirty one registered estate surveying firms were drawn from the study area. The choice of the firms was based on their willingness to participate and ability to supply the required data. Structured questionnaire was used to collect the primary data on the annual rents and capital values of residential and commercial properties in the central business districts and high density zones of the study area.

To achieve the objectives of the study, rates of return for the different classes of properties were estimated from the collected field data see appendix A. Karl Pearson correlation analysis and mean-variance analysis were used to determine the efficiencies/benefits of real estate portfolio diversification across the economic specialization of the cities in South East States of Nigeria. By the application of Karl Pearson correlation analysis, the outcomes of the correlation coefficient analyses were judged to yield portfolio diversification benefits as their coefficients of correlation were -1 and some points less than but not equal to +1.

3.1. The Study Area

Nigeria is divided into six geopolitical zones, among which are South East, South South, South West, North Central, North East and North West. South East geopolitical zone is made up of five States, namely Abia, Anambra, Ebonyi, Enugu and Imo (see figure 1). The people of South East States are predominantly Ibos, the local language of the people is Igbo and the region is known for its high population density. The entire South East States lie within Latitude 4° 40' 00"N, 7° 15' 00"N and 6° 40' 00"E, 8° 25' 00"E.

For the purpose of this study, the four largest and most populated cities in South East Nigeria were selected as the study areas. The cities comprised Aba (Abia state), Enugu (Enugu State), Onitsha (Anambara State) and Owerri (Imo State).

Aba and Onitsha are major commercial cities in South East Nigeria; the projected population of the cities in 2019 are 1,586,287 and 1,349,00 respectively (<https://populationstat.com>> Nigeria); while Enugu and Owerri are administrative cities (state capitals) and educational towns hosting two Universities each, polytechnics and colleges of education with a projected population of 723,575 and 1,297,921 respectively in 2019 (<https://populationstat.com>> Nigeria). The cities were selected based on their outstanding urban status within the region and their apparently perceived differences in economic specializations and business activities. The scale of urbanization of these cities have in recent years attracted real estate investors.

IV. Results And Findings

The results of the correlation analysis indicated that blocks of four number three bedroom flats on two floors and blocks of six number three bedroom flats on three floors in the central business districts (CBDs) were predominantly weakly correlated with similar properties across the cities in the study area (ranging from -0.15 to 0.57) see Tables 1 and 2. These therefore, show that diversifying real estate investment portfolios built with these classes of properties across the selected cities (constituting different economic specialization) offer strong diversification benefits as their covariance patterns were predominantly weakly.

Table 1: Correlation coefficient of the block of four number three bedroom flats on two floors in the CBD across the selected four cities in South East, Nigeria.

	A ₁ 4BF	E ₁ 4BF	O ₁ 4BF	OW ₁ 4BF
A ₁ 4BF	1			
E ₁ 4BF	0.51	1		
O ₁ 4BF	0.06	0.03	1	
OW ₁ 4BF	0.54	0.57	-0.15	1

A₁4BRF- block of four number three bedroom flats on two floors in Aba CBD, **E₁4BF** - block of four number three bedroom flats on two floors in Enugu CBD, **O₁4BF**- block of four number three bedroom flats on two floors in Onitsha CBD, **OW₁4BF**- block of four number three bedroom flats on two floors in Owerri CBD.

Table 2: Correlation coefficient of the block of six flats on three floors in the cbd across the selected four cities in South East, Nigeria.

	A ₁ 6BF	E ₁ 6BF	O ₁ 6BF	OW ₁ 6BF
A ₁ 6BF	1			
E ₁ 6BF	0.27	1		
O ₁ 6BF	-0.03	-0.35	1	
OW ₁ 6BF	0.17	0.06	0.57	1

A₁6BF- block of six number three bedroom flats on three floors in Aba CBD, **E₁6BF** - block of six number three bedroom flats on three floors in Enugu CBD, **O₁6BF** - block of six number three bedroom flats on three floors in Onitsha CBD, **OW₁6BF** - block of six number three bedroom flats on three floors in Owerri CBD.

Tables 3 and Table 4 illustrate related pattern of correlations for the tenement roomy blocks in the CBDs of the study areas; the correlation coefficients were mainly weak and significantly negative coefficients with the exception of tenement roomy residential and shop blocks in Owerri and Enugu produced strong positive correlation coefficients of 0.74 and 0.63 in table 3 and 4 respectively. The results of the correlation matrices of the two Tables 3 and 4) indicate that diversifying tenement roomy blocks of shops or tenement roomy residential blocks across the selected cities (used as the study area) offered diversification benefits.

Table 3: Correlation coefficients of tenement residential property in the CBD across the selected five cities in South East, Nigeria.

	A ₁ RT	E ₁ RT	O ₁ RT	OW ₁ RT
A ₁ RT	1			
E ₁ RT	-0.16	1		
O ₁ RT	0.44	-0.22	1	
OW ₁ RT	0.04	0.74	0.19	1

A₁RT- block of tenement residential property in Aba CBD, **E₁RT**- block of tenement residential property in Enugu CBD, **O₁RT** - block of tenement residential property in Onitsha CBD, **OW₁RT** - block of tenement residential property in Owerri CBD.

Table 4: Correlation coefficient of tenement shops in the CBD across the selected five cities in South East, Nigeria.

	A ₁ TS	E ₁ TS	O ₁ TS	OW ₁ TS
A ₁ TS	1			
E ₁ TS	-0.08	1		
O ₁ TS	0.45	-0.19	1	
OW ₁ TS	0.01	0.63	0.06	1

A₁TS- block of tenement commercial property in Aba CBD, **E₁TS**- block of tenement commercial property in Enugu CBD, **O₁TS** - block of tenement commercial property in Onitsha CBD, **OW₁TS** - block of tenement commercial property in Owerri CBD

The correlation coefficient matrix of the blocks of four number three bedroom flats on two floors in the high density areas across the selected four cities in South East, Nigeria as presented in Table 5 indicate that apart from the outcome of correlating four number three bedroom flats on two floors in Owerri with Aba that produced strong positive (0.69) coefficient others were either moderately, weakly or negatively correlated. These therefore, show that their diversifications across the cities offer high portfolio diversification benefit potentials.

Table 5: Correlations Coefficient of the blocks of four number three bedroom flats on two floors in the high density areas across the selected five cities in South East, Nigeria.

	A ₂ 4BRF	E ₂ 4BRF	O ₂ 4BRF	OW ₂ 4BRF
A ₂ 4BRF	1			
E ₂ 4BRF	0.58	1		
O ₂ 4BRF	0.69	0.53	1	
OW ₂ 4BRF	0.14	-0.04	-0.15	1

A₁4BF- block of four number three bedroom flats on two floors in Aba high density areas, **E₁4BF** - block of four number three bedroom flats on two floors in Enugu high density areas, **O₁4BF**- block of four number three bedroom flats on two floors in Onitsha high density areas, **OW₁4BF**-block of four number three bedroom flats on two floors in Owerri high density areas.

The correlation coefficients of blocks of six number three bedroom flats on three floors in the high density areas diversified across the selected four cities in South East Nigeria as shown in Table 6 turned out to correlate generally low, with the exception of the six number three bedroom flats on three floors located in Onitsha which correlation coefficients with similar properties in Aba and Enugu were above 0.5. The relatively low correlation coefficients produced by this property type indicate that any real estate investment portfolio built with this property type across the cities will produce significant diversification benefits.

Table 6: Correlation coefficient of block of six number three bedroom flats on three floors in the high density areas across the selected five cities in South East, Nigeria.

	A ₂ 6BF	E ₂ 6BF	O ₂ 6BF	OW ₂ 6BF
A ₂ 6BF	1			
E ₂ 6BF	0.44	1		
O ₂ 6BF	0.56	0.56	1	
OW ₂ 6BF	0.25	0.08	-0.08	1

A₁6BF- block of six number three bedroom flats on three floors in Aba high density areas, **E₁6BF** - block of six number three bedroom flats on three floors in Enugu high density areas, **O₁6BF** - block of six number three bedroom flats on three floors in Onitsha high density areas, **OW₁6BF**- block of six number three bedroom flats on three floors in Owerri high density areas

Tenement residential blocks in the high density areas and tenement shops in the high density areas showed a similar pattern of correlation across the cities (see Tables 7 and 8). Apart from both tenement shops and residential blocks located in Aba and Enugu which recorded high correlation coefficients (0.81 and 0.84 respectively), the rest of the correlation coefficients of the property combinations were predominantly low to indicate high diversification benefit potentials.

Table 7: Correlation coefficient of tenement residential property in the high density areas across the selected five cities in South East, Nigeria.

	A ₂ RT	E ₂ RT	O ₂ RT	OW ₂ RT
A ₂ RT	1			
E ₂ RT	0.81	1		
O ₂ RT	0.29	0.04	1	
OW ₂ RT	0.14	0.25	-0.2	1

A₂RT- block of tenement residential property in Aba high density areas, E₂RT- block of tenement residential property in Enugu high density areas, O₂RT - block of tenement residential property in Onitsha high density areas, OW₂RT - block of tenement residential property in Owerri high density areas.

Table 8: Correlation coefficient of tenement shops in the high density areas across the selected five cities in South East, Nigeria.

	A ₂ TS	E ₂ TS	O ₂ TS	OW ₂ TS
A ₂ TS	1			
E ₂ TS	0.84	1		
O ₂ TS	0.33	0.08	1	
OW ₂ TS	0.14	0.24	-0.16	1

A₂TS- block of tenement commercial property in Aba high density areas, E₂TS- block of tenement commercial property in Enugu high density areas, O₂TS - block of tenement commercial property in Onitsha high density areas, OW₂TS - block of tenement commercial property in Owerri high density areas.

To further confirm the benefit potentials of building real estate investment portfolios across the various economic specializations of the cities constituting the study areas, investment portfolios were built by pulling together properties of the same type from the same zone across the cities in the study area. The portfolio returns were estimated using the understated formula:

$$E(R_p) = \sum_{i=1}^n W_i E(R_i) \quad \text{eq. 1}$$

Where:

E(R_p) = expected return on the portfolio

W_i = weight of security i in the portfolio σ^2

E(R_i) = expected return on security i

While the portfolio risk is estimated with the formula below:

$$\sigma_p = \sqrt{w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2 + 2w_1 w_2 \rho_{1,2} \sigma_1 \sigma_2 \dots n} \quad \text{eq. 2}$$

The outcomes confirm high level of diversification benefits through economic specialization portfolio diversification strategy in the study area.

Investment portfolio built by diversifying blocks of six number three bedroom flats on three floors across the central business districts of the selected cities in South East Nigeria recorded the highest modified Sharpe ratio (3.38) with 9.12% rate of returns. This implies that despite that its rate of returns was the fourth highest, yet the portfolio recorded the least level of risk (2.7%) to outperform the other portfolios under this category (see table 9). Portfolio built with similar property class (blocks of six number three bedroom flats on three floors) across the high density zones was ranked second by its performance records (2.99 modified Sharpe ratio, 8.89% returns and 3% risk level). This was closely followed by portfolio built with tenement roomy shops in the CBD zones of the study areas which produced 11.16% returns, 4.31% risk and 2.69 Sharpe ratio.

The rest of the other portfolios built from the remaining property types across the study areas produced lower Sharpe ratios at varying degrees of return and risk levels (see table 9). The outcomes of the returns and risks recorded by the different portfolios showed that the portfolios built on the economic specialization of the cities indicated diversification benefit potentials as the performances of the portfolios outweighed the performances of the individual properties (as shown in appendix A) when compared.

Table 9: Real estate investment portfolio diversification/mean analysis (across the economic specialization of the cities.

Portfolio Diversification Strategy	Portfolio Return (%)	Portfolio Risk (%)	Risk	Modified Sharpe Ratio
Diversifying across the economic specialization of the cities in South East				
I. A block of 4no.3bedroom flat on two floors (CBD)	9.1	4.8		1.89
II. A block of 6no.3bedroom flat on three floors (CBD)	9.14	2.7		3.38
III. A block of tenement residential property in the CBD (14 rooms)	8.8	3.9		2.25
IV. A block of tenement shops in the CBD (14 rooms)	11.6	4.31		2.69
V. A block of 4no.3bedroom flat on two floors in the high density areas	9.12	4.2		2.17
I. A block of 6no.3bedroom flat on three floors in the high density areas.	8.98	3		2.99

II.	A block of tenement residential property in the high density areas (14 rooms)	11.16	5.68	1.96
III.	A block of tenement shops in the high density areas (14 rooms)	12.76	4.9	2.6

V. Conclusion

Diversifying real estate investment portfolio across the economic diversification of the cities indicated high level of diversification benefits potential. This decision was arrived at from the outcome of the Karl Pearson correlation analysis obtained by correlating the properties across the economics specializations of the cities which were predominantly weakly correlated and negatively correlated at other points. This was further confirmed by the mean variance analysis of the different portfolios built with each class of property across the cities. The portfolios were found to produce better risk – return ratio when compared to the performances of the different property class in each of the cities.

Diversifying blocks of six number three bedroom flat on three floors both in the CBDs and high density areas across the cities outperformed other classes of properties under review. This was ascertained by the outcomes of their portfolios which produced the highest modified Sharpe Ratio (3.38 and 2.99 respectively) as shown in Table 9. This implies that it takes one unit of risk to attract 3.38% and 2.99% returns respectively. This finding was further affirmed by the results obtained from the correlation coefficient analysis where the coefficients of these properties were predominantly weak and at other points negative as illustrated in Table 1 – 8.

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Appendix A

Table 1. Performance analysis of different classes of properties in different cities (2008 -2017)

City	Zone	Type of Real Estate	Expected Return (%)	Standard Deviation	Covariance
Aba	CBD	4brf	12	7.76	0.65
		6brf	11.1	7.3	0.66
		Tr	10	7.68	0.77
		Ts	13	8.67	0.67
	High Density	4brf	9.9	8.31	0.84
		6brf	10.8	5.96	0.55
		Tr	10.6	7.73	0.73
		Ts	13.5	7.95	0.59
Etnugu	CBD	4brf	6.5	6.56	1.01
		6brf	7.6	7.59	1.00
		Tr	6.8	5.9	0.87
		Ts	10.8	6.19	0.57
	High Density	4brf	6.3	5.86	0.93
		6brf	4.9	4.01	0.82
		Tr	7.9	5.96	0.76
		Ts	10.6	6.04	0.57
		4brf	7.3	4.77	0.65
		6brf	7.4	6.03	0.82

Onitsha	CBD	Tr	5.4	5.97	1.11
		Ts	6.7	5.94	0.89
	High Density	4brf	7.5	5.08	0.68
		6brf	7.9	4.41	0.56
		Tr	12.8	10.49	0.82
		Ts	12.8	10.3	0.81
Owerri	CBD	4brf	9.8	8.38	0.86
		6brf	8.8	2.62	0.3
		Tr	11.2	5.11	0.46
		Ts	14	6.23	0.45
	High Density	4brf	11.3	5.03	0.45
		6brf	10.6	3.22	0.3
		Tr	13.4	5.85	0.44
		Ts	14.4	5.68	0.39

4brf - Four number three bedroom flats on two floors, **6brf** - Six number three bedroom flats on three floors, **Tr** – Tenement roomy residential blocks, **Ts** – Tenement roomy block of shops.

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