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*Selection of Location Factors in the Luxury Goods Sector Using  
Statistical Methods and the Grey Set Theory*

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### Abstract

**Theoretical background:** The area of interest undertaken in this publication is the impact of location factors on the high turnover of luxury goods sales. The selection of these factors was based on the results of previous studies available in the literature. However, they mainly concern the location of points of sale of each type of goods. Therefore, it was necessary to get acquainted with the specifics of trading in luxury goods and choose those among the factors that are associated with it.

**Purpose of the article:** The analysis covered not only the impact of the factors themselves, but also the links between them and the differentiation of the impact depending on the size of the agglomeration in which the places of sale are located.

**Research methods:** For this purpose, an in-depth statistical analysis and the grey set theory were used. The use of the theory of grey set is important in the case of the research carried out due to the ambiguity of the occurrence of all factors in relation to the sample analyzed. Some of them do not apply to the entire study population.

**Main findings:** The obtained results show the overall importance of location factors for achieving the expected level of turnover, as well as value them within the adopted categories.

### Introduction

Companies operating in a market economy most often set themselves the basic goal of achieving the best financial results. This applies to the marketing of any type of goods, including luxury goods. The level of results can be influenced by many different factors. One of the groups are those related to the location of points of sale and customer service.

The aim of the study was to determine the impact of selected location factors on the amount of turnover achieved by luxury goods sales salons. In their course, five research questions were posed and attempts were made to answer them. First of all, the question was asked whether there are mutual connections between the factors and what their nature is (1), which, in turn, would allow to select those among them that are mutually compatible. Then, the value of each of the analyzed factors of a single location (2) was taken into account, and consequently, which of them are of the highest importance for the results (3); this would allow the ranking of these factors to be developed. Due to the location of salons in towns characterized by significantly different sizes, the study was conducted not only for the entire population, but also for its individual categories separately. In this way, an attempt was made to answer the question what is the importance of individual factors for the achieved turnover in accordance with the adopted categorization of the size of the village (4). Finally,

it is also crucial to determine the importance of the entire category of location-based factors for achieving high financial results in the form of generated turnover (5).

The places of potential purchase, the number of points of sale and their location affect the turnover, as indicated by the research carried out by Kumagai and Nagasawa (2017, 2019). The location of the points of sale is not only important for the implementation of the expected sales volume, considered a success of the business (Doyle & Broadbridge, 1999; Kent, 2003; Clow & Baack, 2010), but also for the very treatment of given goods as luxurious (Heine, 2010), which in order to be treated as such should be characterized by a certain rarity, or limited availability. As a consequence, location-related factors strongly influence purchasing decisions and may influence strategic decisions of enterprises regarding their development (Arrigo, 2015).

The available results of the research conducted so far include a set of factors that affect customer purchasing decisions (Kumagai & Nagasawa, 2017, 2019; Doyle & Broadbridge, 1999; Kent, 2003; Clow & Baack, 2010; Płaziak & Szymańska, 2014). However, they have not been able to identify sufficiently thorough analyses of the relationship between the factors themselves and their impact on the achieved level of turnover. The aim of the study, the results of which are presented in the publication, is to indicate the location factors affecting the achievement of high financial turnover by the network of luxury goods showrooms. The article shows first the types of relationships existing between factors, so that their selection in the final inference can be based on the identified interdependencies, and not only the strength of a single impact on the level of turnover. The calculation of the impact of individual factors was first made using the statistical method, and then deepened using the theory of grey set. The latter also allowed to determine the importance of the analyzed factors depending on the size of the agglomeration in which the sales showrooms were located. Statistical analysis was also used to indicate the importance of location factors treated in general for generating high turnover by luxury goods showrooms. The conclusions developed in the last part were jointly based on all the obtained research results.

## Literature review

### Location and factors that influence its choice

Running a business involves making numerous decisions of a very diverse nature. One of the first, apart from the type of actions taken, is the place where they will be implemented. Location is a special element on the list of marketing tools for the trade and services sector. This is because the planning and management of a company depends to a large extent on its location. Location as a concept is often used in the area of management sciences, it is defined as a place, location used and developed for business activity (Brdulak et al., 2014). The selection of the right location of the business is influenced by the features of the place and the area as well as the degree of compliance with the requirements and needs related to the functioning of the company.

The factors that influence the choice of location can be sorted according to various classifications. This division was made due to the social environment, i.e. potential customers and their number, access to the point of business, current and potential customers and the level of costs associated with functioning in a given place (Table 1). Each author identifies at least one of the factors that drives the choice of location: the desire to maximize benefits or minimize costs for the company. Consequently, the result of a well-chosen location should be high financial results of the company.

**Table 1.** Factors affecting the choice of location

Population	Availability	Competition	Costs
<ul style="list-style-type: none"> <li>– population (Arrigo, 2015)</li> <li>– age structure (Campo et al., 2000)</li> <li>– household size (Campo et al., 2000)</li> <li>– income level (Campo et al., 2000)</li> <li>– disposable income per capita (Campo et al., 2000)</li> <li>– economic stability (Campo et al., 2000)</li> <li>– unemployment rate (Campo et al., 2000)</li> <li>– seasonal fluctuations (Applebaum, 1966)</li> <li>– population density (Campo et al., 2000)</li> <li>– age/types of residential buildings (Bultez &amp; Naert, 1988)</li> <li>– plans for the demolition of the building (Bultez &amp; Naert, 1988)</li> <li>– lifestyles (Johnstone, 2012)</li> <li>– current shopping patterns (Kumagai &amp; Nagasawa, 2019)</li> <li>– consumers are evenly distributed in the business environment (Wood &amp; Tasker, 2008)</li> </ul>	<ul style="list-style-type: none"> <li>– pedestrian traffic (Moore et al., 2010)</li> <li>– public transport (types, costs, ease of use, development) (Moore et al., 2010)</li> <li>– number of car owners, road network (conditions, permitted speeds, traffic jams, restrictions, plans) (Moore et al., 2010)</li> <li>– parking lots (capacity, ease of access, costs, development opportunities) (Moore et al., 2010)</li> <li>– location, potential point of sale visibility (Barreneche, 2008)</li> <li>– availability of staff (Moore et al., 2010)</li> <li>– availability of suppliers (Moore et al., 2010)</li> </ul>	<ul style="list-style-type: none"> <li>– current commercial activity (direct competitors, downstream competitors, magnet stores, total attractiveness) (Nobbs et al., 2012; Wood &amp; Tasker, 2008)</li> <li>– current trade specifications (retail areas, estimated turnover, store/product analyzes, age of points of sale, typical point of sale design, car parks) (Wood &amp; Tasker, 2008)</li> <li>– potential development of competition (Kumagai &amp; Nagasawa, 2019)</li> <li>– expansion of sellers (Kumagai &amp; Nagasawa, 2019)</li> <li>– modernization (Campo et al., 2000)</li> <li>– repositioning (Campo et al., 2000)</li> <li>– competitors’ strategies (Kumagai &amp; Nagasawa, 2019)</li> <li>– benefits of agglomeration resulting from concentration of producers and consumers in a certain area (Kumagai &amp; Nagasawa, 2019)</li> </ul>	<ul style="list-style-type: none"> <li>– lease terms (Rhim et al., 2003)</li> <li>– preparation of the site for construction (Bultez &amp; Naert, 1988)</li> <li>– building restrictions (Bultez &amp; Naert, 1988)</li> <li>– construction costs (Ghodsypour &amp; O’Brien, 2001)</li> <li>– taxes (Rhim et al., 2003)</li> <li>– necessary modernizations (Rhim et al., 2003)</li> <li>– maintenance/maintenance costs (Ghodsypour &amp; O’Brien, 2001)</li> <li>– employee availability/rates, labor costs (Ghodsypour &amp; O’Brien, 2001)</li> <li>– media/promotion costs (Ghodsypour &amp; O’Brien, 2001)</li> <li>– fixed value of transport costs (Ghodsypour &amp; O’Brien, 2001; Keskin et al., 2010)</li> <li>– delivery costs (Ghodsypour &amp; O’Brien, 2001; Keskin et al., 2010)</li> <li>– sources and consumption of raw materials are known and appropriately located (Keskin et al., 2010)</li> </ul>

Source: Authors’ own study based on (Arrigo, 2015; Campo et al., 2000; Applebaum, 1966; Bultez & Naert, 1988; Johnstone, 2012; Kumagai & Nagasawa, 2019; Wood & Tasker, 2008; Moore et al., 2010; Barreneche, 2008; Nobbs et al., 2012; Rhim et al., 2003; Ghodsypour & O’Brien, 2001; Keskin et al., 2010).

More and more often, factors with links to elements of psychology and sociology are also noticed. That is why today special attention is paid to sometimes difficult to measure location factors, such as human and social capital, the presence of insti-

tutions and organizations focused on creating conditions supporting the functioning of the market economy (Kumagai & Nagasawa, 2019).

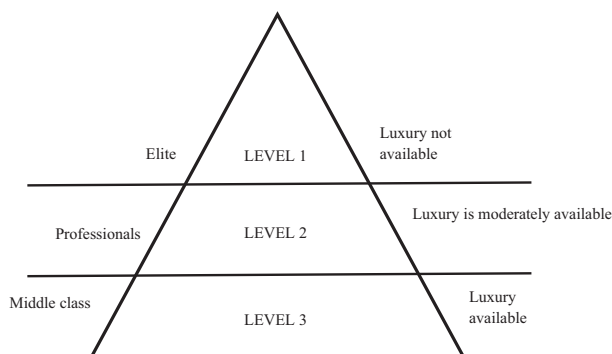
### Luxury goods

The concept of luxury has many definitions, ranging from defining a good or service with something expensive to its uniqueness (rarity) (Ko et al., 2019). Luxury in the context of a luxury brand most often indicates an exclusive good, available to selected, at the same time original, characterized by sophistication, as with an exorbitant price, resulting, among others, from a particularly high quality material or service (Hauck & Stanforth, 2007). Physical attributes do not constitute a clear indication of the potential of a luxury brand. Creating such a character is based on providing the consumer with such values as symbolism (promotion of the company building its recognition among other luxury brands) and non-materiality (uniqueness, as well as difficulty of accessibility increases the level of the brand) (Dryl & Dryl, 2017).

Luxury goods are characterized by special features, such as (Bochańczyk-Kupka, 2014):

- valued quality,
- relatively high price,
- rarity and uniqueness (uniqueness),
- aesthetics and design,
- heritage,
- brand history,
- the notion that a good is not necessary for existence.

Luxury in the context of purchasing products, both goods and services, is gradual (Figure 1). Three levels are most often mentioned here, depending on the difficulty of acquiring it, resulting from the aforementioned characteristics (Jiang & Nagasawa, 2016).



**Figure 1.** Levels of luxury in the purchase of goods

Source: Authors' own study based on (Allières, 1990).

Marketing a luxury product becomes a good, the price of which is higher and higher and reaches the highest possible level that the consumer is able to pay at any given moment (Leibenstein, 1950). The customer associates high value with luxury, uniqueness and unavailability, buying this product confirms the belief that it raises its social status by joining an exclusive group, having sublime taste and prestige.

## Research methodology

### The scope of data

The company subject to the study was a company trading in luxury goods. One of the characteristics that a luxury brand should have is considered to be limited distribution (Kotler, 2022). The distribution strategy used by the investigated company can be defined as exclusive distribution or exclusive distribution, which restricts the sale of goods only to a specific chain of stores or a single point of sale. It is not possible to offer certain products by other entities. Therefore, the aesthetics of the points of sale, visualization and their location are important elements of the marketing message that directs the company to regular and potential customers and other representatives of the environment, for example, competition (Keller, 2009). Points of sale are the point of contact of the brand with the customer, so they can serve as a tool for creating symbolic aspects of the brand and building its image among the community (Sung & Tinham, 2005). In the era of technological progress and continuous development of online commerce, stationary stores are beginning to perform different functions than before. They are the point of contact with the customer. The place where you can view the product before you purchase it also allows you to collect or return online orders. Increasingly, they also play the role of warehouses and shipping places.

The selection of the scope of data that were subject to further analysis was made in the context of their importance for the trade in luxury products. The factors listed in Table 1 and the aspect of their importance for higher-order goods were therefore taken into account. In order to determine the scope of data, interviews with decision-makers in the surveyed company were used, documentation obtained from it specifying the conditions for selecting new locations and literature analysis. The factors provided in Table 1 were considered in terms of their relevance to the luxury market. As a result, a list of factors was selected for the study, which were included in Table 2, along with an indication of their measures.

**Table 2.** A list of factors tested with an indication of their measures

	Factor	Factor measure
x1	the population of the city	number
x2	store area	m <sup>2</sup>
x3	the size of the shopping gallery	number of brands in the gallery

	Factor	Factor measure
x4	location in the city	city center; the vicinity of the center; the outskirts of the city; suburb
x5	distance from the nearest bus or train station	at a distance of up to 500 m; further away
x6	the number of galleries in the city	number
x7	possibility of using free parking	yes/no
x8	the number of stores of competing companies in the shopping center in the gallery where the store is located	number
x9	visibility of the showroom from the main entrance to the gallery or exit from the parking lot	yes/no
x10	layout of premises	location of the premises, among other shops; corner position; the showroom is located directly at the intersection of two gallery avenues
x11	the gallery floor where the showroom is located	-1 – floor below the ground floor; 0 – ground floor; 1 – first floor; 2 – second floor
x12	evaluation of the showroom on Google Maps	0.0 (lowest rating) to 5.0 (highest rating)
x13	rating on Google Maps of the gallery in which the salon is located	0.0 (lowest rating) to 5.0 (highest rating)
x14	number of gallery ratings on Google Maps	number
y	turnover – reference value	number of PLN thousand/year

Source: Authors' own study.

## Research methods

The analysis is of an explanatory nature and was carried out using quantitative research methods and based on the analysis of secondary data obtained in the form of a tabular summary. It should be included in the category of historical research due to the criterion of time and sporadic research due to the criterion of continuity. In particular, the following were used: comparative analysis, correlation analysis, coefficient of variation, Hellwig's method, multiple regression analysis, expert analysis and grey systems theory.

The comparative analysis consisted in comparing the location factors and checking their mutual impact. In many cases, factors interact with each other, making it easier or more difficult to achieve the expected financial results. The interaction between the various factors can be either positive (+) or negative (-). This method is used to compare all selected variables in pairs (Hamrol & Mantura, 2006).

Correlation analysis is a mathematical method used in statistics. Correlation is a measure of the relationship between two variables. It involves examining whether two variables are statistically significantly related. The correlation strength was determined on the basis of ranges:

$0.0 \leq |r| < 0.2$  – no relationship

$0.2 \leq |r| < 0.4$  – poor relationship

$0.4 \leq |r| < 0.6$  – moderate relationship

$0.6 \leq |r| < 0.8$  – strong relationship

$0.8 \leq |r| < 1$  – very strong relationship

The Hellwig method used in the study is also known as the index of information capacity. Explanation variables selected for the model should be strongly correlated with the dependent variable  $y$  and weakly related to each other.

Multiple regression methods were used to analyze the data. Multiple regression analysis involves establishing a statistical relationship between dependent variables and a set of independent variables. It allows for a quantitative description of the relationships between measurable characteristics. It determines the strength of the relationship between them, statistical significance and determines the importance of each relative independent (Więcek-Janka, 2020). After analysis, it is possible to determine the regression equation, which describes the relationship between the characteristics and takes into account the random component.

The collected data were also analyzed using the grey set theory (Oleśków-Szałapka et al., 2019). This theory is based on the assumption that the examined fragment of reality is only a combination of selected data, not a complete representation of all the elements and connections that make up it (if this were the case, it would be a white set) (Ragin-Skorecka, 2016). This is also the case in the search for the factors that have the strongest impact on the location of luxury showrooms. The selected variables were selected using an expert method from a set developed on the basis of literature research. The collection is therefore not finished, which may already justify the application of the grey set theory. Another is that in the case of some factors, the scale of measurement used in their reference is not possible to achieve for selected points of sale (such as in the case of locating a showroom on the second floor of a gallery in a situation where it is one-story).

The method of factor analysis based on the grey set theory is used to organize them and, consequently, simplify the analysis of their combination. Thanks to this, conclusions can be drawn based on the results, taking into account individual data and examining their impact on the reference value. It is also possible to combine them into interacting factor categories and check the total impact on the goal criterion (Więcek-Janka, 2017).

Due to a large research sample, covering the full population of units – data came from all stores of a given company, which were located in Poland, it was decided to detail the survey in the case of selected analyzes by dividing it into groups due to the number of cities in which there were points of sale. The basis for the division was the categorization used in GUS (2023) studies. Table 3 indicates the number of salons located in each group.

**Table 3.** Number of salons divided according to the number of cities

Population in the city	up to 50,000	50,001–100,000	100,001–250,000	250,001–500,000	500,001–1,000,000	above 1,000,000	all data
Number of rooms	22	27	36	10	32	16	143

Source: Authors' own study.



The factors with the greatest synergy potential are x12 (evaluation of the showroom on Google Maps), x1 (number of inhabitants living in a given city) and x13 (evaluation on Google Maps of the gallery in which the showroom is located). The factors x3 (size of shopping mall) and x14 (number of gallery ratings on Google Maps) are also of importance.

## The importance of location-related factors

### The results of the correlation analysis and the Hellwig method

The correlation matrix between explanation and explanation variables shows the correlation value between individual variables. The reference value, which is the volume of turnover at individual points of sale, has already been included in the analysis.

**Table 4.** The correlation between the different variables

	y	x1	x2	x3	x4	x5	x6	x7	x8	x9	x10	x11	x12	x13	x14
y	1														
x1	0.290	1.000													
x2	0.343	0.073	1.000												
x3	0.576	0.387	0.258	1.000											
x4	0.065	0.052	0.109	0.079	1.000										
x5	0.018	0.052	0.006	0.014	0.391	1.000									
x6	0.314	0.890	0.151	0.417	0.030	0.071	1.000								
x7	0.147	0.052	0.099	0.081	0.349	0.097	0.073	1.000							
x8	0.505	0.303	0.274	0.640	0.146	0.121	0.370	0.216	1.000						
x9	0.007	0.002	0.059	0.085	0.158	0.055	0.006	0.070	0.047	1.000					
x10	0.109	0.028	0.015	0.015	0.025	0.126	0.021	0.012	0.068	0.249	1.000				
x11	0.007	0.005	0.163	0.026	0.175	0.147	0.006	0.024	0.107	0.183	0.010	1.000			
x12	0.053	0.019	0.009	0.030	0.048	0.046	0.002	0.138	0.158	0.146	0.211	0.106	1.000		
x13	0.421	0.205	0.157	0.680	0.086	0.027	0.250	0.054	0.565	0.139	0.014	0.072	0.170	1.000	
x14	0.624	0.406	0.239	0.632	0.165	0.162	0.405	0.254	0.609	0.003	0.069	0.012	0.099	0.464	1.000

Source: Authors' own study.

There is a strong correlation between the variable x1 (population of a given town) and x6 (number of galleries in a given town). This means that the number of galleries is related to the population. Next were the dependency x3 and x8, i.e. the number of brands in the gallery and the number of stores of competing brands, x3 and x14, taking into account again the number of brands in the gallery, but juxtaposed here with the number of gallery ratings on Google Maps, which, in turn, show a relatively significant correlation with the level of turnover at the point of sale (x14 and y). The last thing worth mentioning is the relationship between x8 and x14, i.e. the number of stores in the gallery and the number of ratings of this gallery on Google Maps.

Then, the correlation module was configured and the Hellwig method was applied. As a result, the combination of parameters x2 (store size), x3 (gallery size) and x14 (number of gallery ratings on Google Maps) was considered to be the most significant for achieving high results.

In the course of the data analysis, a list of factors divided according to the number of cities was also prepared based on Pearson's linear correlation coefficient (Table 5). Their importance for achieving high turnover varies depending on the size of the cities in which the showroom is located. The lack of value in the group of cities with above 1 million inhabitants for the x6 factor – the number of all galleries in a given city – is due to the location of all of them in the only as large agglomeration in Poland.

**Table 5.** A comparison of the effects of the factors according to the number of cities

Population in the city:	up to 50, 000	50,001–100,000	100,001–250,000	250,001–500,000	500,001–1,000,000	above 1,000,000
x2	0.250662922	-0.074107494	0.234445495	0.192227148	0.517935393	0.368746567
x3	0.52949407	0.461684424	0.529002447	0.614664138	0.509099949	0.61469104
x4	0.100901721	-0.123346375	0.128291442	0.396117134	0.062874079	0.081704667
x5	0.064742641	-0.156885967	0.025730621	0.15490952	0.021378878	0.137354638
x6	0.313628937	0.224705499	0.006335883	0.161637758	0.10301281	x
x7	-0.073365824	-0.284520365	-0.07183855	-0.297578911	-0.118444773	0.018716843
x8	0.358503674	0.23792834	0.386915452	0.048522568	0.570779866	0.636356024
x9	0.039522013	0.11065165	-0.085144253	-0.48346458	0.167012594	-0.015929133
x10	0.094390347	0.06910219	0.361634131	0.574757283	0.205446666	-0.420001385
x11	0.259583959	-0.285591093	0.080531709	0.053768506	-0.101317857	0.218608378
x12	0.345922952	0.012288206	0.232254328	-0.080492432	-0.195741557	0.142961466
x13	0.475531664	0.191953316	0.443234914	0.485194811	0.524726007	0.510604952
x14	0.650280782	0.01343578	0.51686972	0.756863269	0.661930245	0.796287623

Source: Authors' own study.

In the least numerous cities, the most important factors affecting the volume of sales points are the ratings obtained by the gallery on Google Maps (x13), in which it is located, and the number of these ratings (x14), as well as the size of the gallery itself. Also important is the evaluation of the salon itself (x12) and number of competitors in the gallery (x8), understood as the number of points with a similar offer.

In the second group, which includes towns from 50 to 100 thousand inhabitants, the size of the gallery where the showroom is located (x3) is definitely the most important influence. Further importance is attributed to its evaluation on Google Maps (x13) and the number of competitors in the gallery (x8). The volume of turnover is also influenced by competitiveness not only in the area of shops, but also in the galleries themselves (x6).

The largest importance for the profitability of the company in cities with a population between 100 and 250 thousand is the size of the gallery in which the salon is located (x3) and the number of ratings (x14) that the gallery received on the Internet,

and their value (x13). The importance of the nearest competition (x8) is still visible here. The convenient location of the premises (x10) is also important for customers, so that it can be easily seen.

A similar set can be seen in a group of shops located in towns with a population between 250 and 500 thousand. The most important thing here is the ability to get information from Google Maps – the number of gallery ratings (x14) and the level of this rating (x13) and the size of the gallery (x3). The convenience of locating the premises in a shopping center (x10), increasing its visibility is also one of the significant factors.

The repeated importance of each of them can also be seen in the next group of salons, which are located in agglomerations ranging from 500 thousand to 1 million. Also here, the number and level of ratings on Google Maps for galleries (x13 and x14) and the size of the gallery (x3) stand out. The number of competing stores has an impact on the level of turnover (x8), as well as the area of the store itself (x2).

In the largest Polish city, where the company has as many as 16 stores, their profitability is influenced by the online information about the gallery (x13, x14), the size of the gallery (x3) and the competitiveness in the immediate environment (x8).

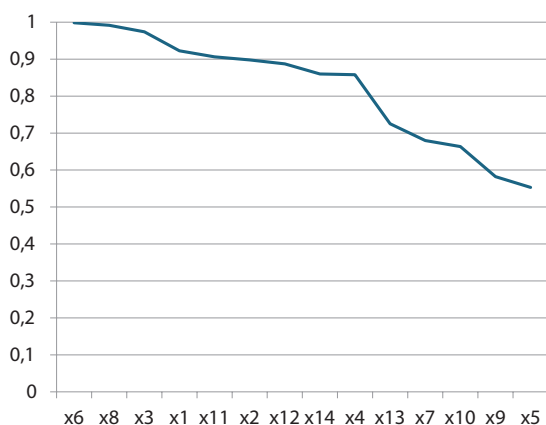
Among the set of factors divided according to the number of cities in which sales outlets are located, there is a certain regularity of the importance of their influence in each of the highlighted groups. In all of them, the size of the gallery in which you can buy the products of the surveyed company (x3) and the level of ratings that individual galleries have on Google Maps (x13) are of great importance. On the other hand, the smallest importance in all cities for the volume of turnover realized by showrooms is the possibility of free parking at the gallery (x7). It is probably a convenience so common that it does not require attention.

### **Results of analysis using the grey set theory**

Using the grey set theory allows to indicate which of the tested factors most significantly affect the reference value (Mierzwiak & Nowak, 2020). In the case of analyzed data, the factors x6, x8 and x3 can be counted in the first place. They constitute the first group (A) of location-related variables whose values have the highest correlation with turnover achieved at points of sale (Liu & Lin, 2006). All these variables are related to direct physical competition on the market, because they concern the number of galleries in a given town, its size and the presence of competing companies in the immediate vicinity.

The second group (B) are factors x1, x11, x2 and x12. Here the impact is still noticeable, but slightly smaller than in the case of the group with the highest values. These factors still affect the financial reference value, but their importance is much smaller. This group includes the number of potential customers, measured by the number of inhabitants of a given town, the size of the sales store and its ease of access – the floor on which it is located – and the store's evaluation on Google Maps.

Following the grouping by city size, the results shown in Table 6 were obtained. The list indicates their large diversity depending on the size of the local community. This results not only from the different importance of factors shaping consumer choices, but also from reference values that, after division, are different for each group (Liu et al., 2017). In the situation of distribution, the reference value became the turnover realized by salons located in selected cities.



Group	Factor	Value
A.	x6	0.998469
	x8	0.991692
	x3	0.973799
B.	x1	0.922727
	x11	0.906298
	x2	0.897922
	x12	0.887097
C.	x14	0.860066
	x4	0.857911
D.	x13	0.725038
	x7	0.679724
	x10	0.663594
	x9	0.582181
	x5	0.552995

Figure 4. The influence of factors on the reference value

Source: Authors' own study.

In the least numerous cities, the most important factors appear information related to the evaluations of the salon and the entire gallery in which it is located and the number of these ratings (x12, x13, x14). Therefore, the information available on websites is in the foreground, in the second place the size of the gallery (x3) and the range of choice among available shopping places, represented by the number of galleries in the town (x6) is of the importance.

In the second group of cities, communication factors such as the distance of the gallery from the nearest transport hub (x5) or the possibility of using a free parking lot (x7) were of particular importance. In addition, the size of the gallery (x3) and thus the number of ratings on Google Maps (x14) is also important, as is the conspicuous location of the showroom on the gallery plan (x9).

The largest group of salons (36) is located in towns of 100 to 250 thousand inhabitants. The factors most affecting the volume of turnover here are those related to the number (x6) and location of the gallery in the city (x4) and the evaluations of the gallery in which the sales store of the company is located. The ease of finding a point of sale after entering the gallery (x9) and the ease of reaching it from the nearest railway or bus station (x5) are also of great importance here.

The results in the group of salons located in towns of 250 to 500 thousand inhabitants are the most consistent with the results for the entire research sample.

The most important factors here are those related to the place of trade. What is important is the competitive environment (x8), the number of places in the city that meet similar needs (x6), as well as the commercial area of the showroom itself (x2). Other high-impact factors, as in the least numerous cities, are related to the ratings of the showroom and the entire gallery in which it is located and the number of these ratings (x12, x13, x14).

**Table 6.** The influence of factors on the reference value divided according to the number of cities

Population in the city:	up to 50,000	50,001–100,000	100,001–250,000	250,001–500,000	500,001–1,000,000	above 1,000,000	all data
Number of rooms:	22	27	36	10	32	16	143
x2	13	6	13	3	11	7	5
x3	4	1	12	7	7	6	3
x4	11	12	4	11	2	8	8
x5	8	2	1	9	3	10	13
x6	5	13	3	2	9	13	1
x7	6	4	9	12	10	3	10
x8	10	11	7	1	12	9	2
x9	9	5	2	10	1	1	12
x10	12	8	8	13	8	2	11
x11	7	10	10	8	5	5	4
x12	1	9	6	4	13	4	6
x13	2	7	5	6	6	11	9
x14	3	3	11	5	4	12	7

Source: Authors' own study.

The volume of turnover in cities with a population between 500 thousand and 1 million inhabitants is influenced by factors that are particularly related to the ease of reaching the salon. It should be located in a convenient location in the city (x4), close to communication hubs such as railway or bus station (x5), and also well visible at the entrance point to the gallery (x9). Also important is the location of the store in the gallery (x11) and the level and number of gallery ratings in Google Map (x13, x14).

In the largest cities, the level of turnover is primarily influenced by the organization of the premises (x10), its visibility from the entrance to the gallery (x9) and ease of access to the showroom (x11). The possibility of leaving the car at the gallery without having to pay a fee (x7) and evaluating the point of sale on Google Maps also significantly affect the store's results.

### Results of multiple regression analysis

The values of the regression coefficients show how changing the explanation variable unit affects the change of the dependent variable unit, assuming that the other explanation variables remain unchanged. Analyzing the regression results, it can

be seen that the coefficient determining the matched  $R$  square is about 0.46, which means that the explanatory variables  $x$  (the extracted location factors) describe the explained variable  $y$  (the turnover) in 46%.

This means that selected location factors with the best fit for the model, such as store size, gallery size and the number of gallery reviews on Google Maps, affect turnover only 46%. The value of 0.46 is quite low, which means that the model is poorly matched to the data. Location factors are therefore not sufficient to fully explain the amount of turnover in a given store, however, it is worth paying attention to the above-mentioned factors, which of all selected location factors are the most important.

## Conclusions

The aim of the work, the results of which were presented in the publication, was to indicate the location factors affecting the achievement of high financial turnover. For this purpose, answers to five research questions were sought.

The first one concerned the relationship between the factors analyzed. Mutual interactions are defined here, together with an indication of their – supporting or excluding nature. In the case of expert analysis of the interaction of factors, those that have the greatest synergistic potential are  $x_{12}$  (showroom evaluation on Google Maps),  $x_1$  (number of people living in a given city) and  $x_{13}$  (assessment on Google Maps of the gallery in which the given salon is located). Also  $x_3$  (size of shopping mall) and  $x_{14}$  (number of gallery ratings on Google Maps) are important.

Two further research questions concerned the determination of the impact of individual location factors on the level of turnover and the development of a ranking of these factors; they were considered in parallel using statistical analysis (the Pearson correlation module and the Hellwig method) and the grey set theory.

As a result, in the statistical analysis, the combination, which consists of parameters  $x_2$  (store size),  $x_3$  (gallery size), was considered the most important for achieving high results,  $x_{14}$  (number of gallery ratings on Google Maps).

In the study using the theory of grey set, special importance can be seen in the first place in relation to factors  $x_6$ ,  $x_8$  and  $x_3$ . All of them are related to direct physical competition on the market, because they concern the number of galleries in a given town, its size and the presence of competing companies in the immediate environment. Factors  $x_1$ ,  $x_{11}$ ,  $x_2$  and  $x_{12}$  are also quite significant. They still have an impact on the financial reference value, but their importance is much smaller. In this group there is the number of potential customers, measured by the number of residents of a given locality, the size of the sales showroom and its ease of access – floor, on which it is located – and the rating of the salon on Google Maps.

The fourth research question concerned the importance of localization factors broken down into groups according to the category of agglomeration size. The value

of the variable, which is the population in a given locality, has a relatively high importance in the theory of grey set and in the analysis of synergy. This was a contribution to its adoption as a basis for the division of the obtained data for further analysis. Its results are not unambiguous for all studied groups (Table 7).

**Table 7.** Summary of results for Pearson correlation analysis and the grey set theory

Population in the city:	up to 50,000		50,001–100,000		100,001–250,000		250,001–500,000		500,001–1,000,000		above 1,000,000	
x2	0.25	13	-0.07	6	0.23	13	0.19	11	0.52	7	0.37	5
x3	0.53	4	0.46	1	0.53	12	0.61	7	0.51	6	0.61	3
x4	0.10	11	-0.12	12	0.13	4	0.40	2	0.06	8	0.08	8
x5	0.06	8	-0.16	2	0.03	1	0.15	3	0.02	10	0.14	13
x6	0.31	5	0.22	13	0.01	3	0.16	9	0.10	13	x	1
x7	-0.07	6	-0.28	4	-0.07	9	-0.30	10	-0.12	3	0.02	10
x8	0.36	10	0.24	11	0.39	7	0.05	12	0.57	9	0.64	2
x9	0.04	9	0.11	5	-0.09	2	-0.48	1	0.17	1	-0.02	12
x10	0.09	12	0.07	8	0.36	8	0.57	8	0.21	2	-0.42	11
x11	0.26	7	-0.29	10	0.08	10	0.05	5	-0.10	5	0.22	4
x12	0.35	1	0.01	9	0.23	6	-0.08	13	-0.20	4	0.14	6
x13	0.48	2	0.19	7	0.44	5	0.49	6	0.52	11	0.51	9
x14	0.65	3	0.01	3	0.52	11	0.76	4	0.66	12	0.80	7
Important factors	x3, x13, x14		x3		x13		x4, x14		x3		x2, x3	

Source: Authors' own study.

Taking into account the juxtapositions of the two analyses made using Pearson correlation and the theory of grey set, it was tried to check whether it is possible to make unambiguous inferences based on them. However, the results obtained in these two ways are very divergent. Factors that show similar significance in each group are indicated in the last row of the statement (Table 7). Among the factors strongly affecting the level of turnover in the smallest cities, the most important are the size of the gallery (x3) and the number of its ratings on Google Maps (x14), which coincides with the results for the entire research sample. Factor x3 (gallery size) is the one that occurs most often in all studied groups, being at the same time the only distinguished in the division into categories of cities for those among them, which have a population of 50 to 100 thousand and from 500 thousand to 1 million inhabitants. As a result coinciding for two research methods and having a high importance for the level of turnover, it also occurs in the only city over 1 million inhabitants. In turn, the number of ratings on Google Maps (x14) is significant in towns with a population of 250 to 500 thousand.

The last research question was related to the determination of the importance of all location factors for generating high turnover values in luxury goods showrooms. A significant value here is the regression result, where it can be seen that the coefficient is about 0.46, which means that the explanatory variables  $x$  (separated localization factors) describe the explained variable  $y$  (turnover) in 46%. Location factors are therefore not sufficient to fully explain the turnover in a given store.

The basic aim of the research was achieved, because in the course of the conducted research results were obtained to indicate those among a set of factors whose impact on the level of turnover is particularly important. The factor distinguished in the correlation analysis and using grey collections for the entire population of the surveyed points of sale is the size of the shopping mall ( $x_3$ ). At the same time, this factor was distinguished as having a high synergy effect in relations with other factors taken into account in the analyzes. The second, which was also distinguished in these two approaches is the store area ( $x_2$ ), but it is not characterized by high synergistic potential. However, the  $x_{14}$  factor has a significant value, which is the number of gallery ratings on Google Maps, in which the store is located. It is also indicated as strongly affecting the values of turnover in the correlation analysis.

Extensive research was carried out on a rarely available, full set of data for a given company. They indicate the importance of the size of the gallery ( $x_3$ ) and the intensity of using the option to rate them on Google Maps ( $x_{14}$ ) to achieve high levels of turnover. It can therefore be suggested to choose large shopping malls when making location decisions for the opening of further showrooms and to encourage customers to evaluate them on the Internet.

However, the results of the regression analysis show that localization factors do not have a dominant impact on the level of turnover achieved. One should take into account those that are of the greatest importance. Justification of the results of individual showrooms should also be sought among categories other than location, which will be a continuation of the research and the results presented.

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