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# Behavioural location theory – evolution, tools and future

**Business location theory has already been discussed in this journal in various contexts, for example in articles by H. Godlewska-Majkowska, K. Kuciński, A. Rutkowska-Górak, A. Kałowski. However, to our knowledge, the behavioural approach has not yet been presented here and we would like to fill the gap and offer a review of selected authors' works and concepts from this field and hopefully inspire other scholars to develop this promising research direction. In addition, a quantitative analysis of publications on behavioural location theory will be presented.**

For the purposes of this article we will define the behavioural location theory as the inclusion of psychological and subjective circumstances of the decision makers into location theory, such as bounded rationality, heuristics usage and subjective spatial perception.

The behavioural approach seems underutilised in location theory despite its potential to explain many of business location decisions which are inconsistent with the profit maximisation principle. According to R. Domański [1995]: *so far it has not been satisfactorily examined how the perception of space influences spatial behaviour of people. Nobody objects that many decisions, at least in part, depend on how people perceive the space surrounding them,*

*how they differentiate it and what value they place on different elements of this space.* According to W. Dziemianowicz [1997]: *the assessment of location factors by decision makers most often depends on specific qualities of the business and qualities of the decision maker.* Surprisingly, decades have passed since last important contributions in the field of behavioural location theory.

## Overview of the location theory

Location theory has its roots in XIX century, when J.H. von Thunen offered the agricultural activity location theory in 1826. The interest in location theory revived more than 50 years later, mainly thanks to the works of W. Launhardt [1882] and A. Marshall [1886]. Important dates are also 1909, when A. Weber developed his industrial location theory and proposed the notion of a location factor and 1933, when the first theory of services location emerged, authored by W. Christaller.

Then the development of location theory accelerated, with contributions of such authors as A. Loesch [1939], F. Perroux [1964] or P. Krugman [1991]. It can be argued that thanks to P. Krugman location theory entered the mainstream economics, which neglected spatial issues for a long time.

Different location theory traditions put the emphasis on different aspects. For example, classical approach theorists

indicate minimising production cost as the goal of the location decision maker while behavioural approach suggests satisfactory choice as a goal. According to H. Godlewska-Majkowska, there are five approaches to location theory: classical, neo-classical, structural, behavioural and contemporary. Their focus points are briefly explained in Table 1.

There are three similar but distinct terms related to the business location choice:

- location factors – specific qualities of particular places which have direct impact on investment volume during building of the company’s plant (plants) and the net profitability of business activity run in those places [Godlewska-Majkowska, 2001],
- location virtues – specific qualities of places which contribute to it that identical investments will differ depending on location in terms of investment volume, total production cost, sales revenue and taxes [Godlewska-Majkowska, 2015],

location circumstances – internal and external phenomena which transform a location virtue into a location factor. Internal phenomena can be for example: industry, size and ownership structure of the business. External phenomena include among others economic, environmental and cultural issues [Godlewska-Majkowska, 2013].

Clearly, location requirements are different for various sectors. Therefore, loca-

tion factors are divided into general (those applying to all or many sectors) and sector-specific (those applying to one or few sectors).

There are also other classifications of location factors. The importance of subjective factors in the location choice is reflexed in the classification by Grabow et al. [1995] into soft and hard location factors, on the basis of H. Godlewska-Majkowska [2015]. Hard factors are more traditional, have direct influence on business activity and are easily measurable, while soft factors have indirect influence on business activity and are difficult to quantify.

It is worth to note that authors of this classification consider both kinds of factors as equally important and find even the soft factors as ones, which can be parametrised, measured and compared. Figure 1 presents the classification in a more detailed way.

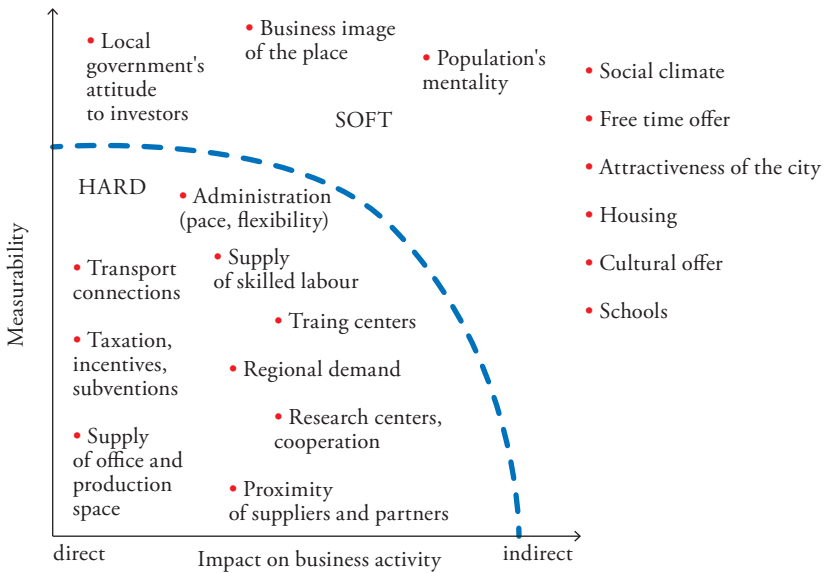
In our view, Grabow et al. [1995] showed an excessive scepticism when it comes to measurability of some factors. For example, the local government attitude towards investor may be measured by places in investment attractiveness rankings, such as ‘Gmina na 5!’ conducted every year by Institute of Enterprise at Collegium of Business Administration at Warsaw School of Economics. Apart from it, the classification should be considered to be validated as more than 20 years had passed since its publication and made more precise, because as H. Godlewska-Majkowska [2015] points out, some fac-

**Table 1 Different approaches to the business location theory**

| Approach      | Focus   |
|---------------|---|
| classical     | minimising production cost  |
| neo-classical | maximising sales price  |
| structural    | limited autonomy of businesses in location choice                                       |
| behavioural   | bounded rationality and subjective factors, satisfactory (non-optimal) choice as a goal |
| contemporary  | profit maximisation   |

Source: own elaboration on the basis: H. Godlewska-Majkowska, *Produkcja przemysłowa*, in: K. Kuciński (ed.), *Geografia ekonomiczna*, Wolters Kluwers, Warszawa, 2015.

Figure 1 **Soft and hard location factors according to Grabow, Henckel, Hollbach-Grömig**



Source: B. Grabow, D. Henckel, B. Hollbach-Grömig [1995], *Weiche Standortfaktoren*, Kohlhammer.

tors seem to overlap – social climate is presented as separate factor than local government attitude towards investor, but in fact the former includes the latter.

### Location decision

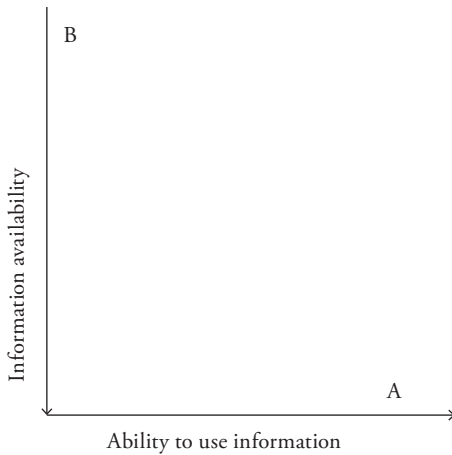
Each business has to choose its location and the effect of business location selection is called location decision. Location decision may be the result of a more or less formal procedure. There is a consensus among scholars that business location decision is important for entity's economic performance. At the same time, it is acknowledged in the literature that subjective factors (such as bounded rationality) play a non-negligible role in location choice. As R. Domański [2004] outlines, location decision makers *usually have limited knowledge and incomplete information and in many cases the decision maker does not behave like the homo oeconomicus. Sometimes he has limited or biased information about his decision situation and at the same time he assessed the incomplete information in a subjective way.*

*If the situation is complicated, he has to simplify it by using intuitional rules in decision making. He does not try to achieve the optimal result but rather a satisfactory one.* Such statements suggest R. Domański finds bounded rationality model convincing.

According to classical, neoclassical and contemporary business location theory the decision maker undertakes the optimal choice, while heterodox approaches such as behavioural location theory claim making an optimal choice is impossible. The classical, neoclassical and contemporary theorists assume decision makers are *homo oeconomicus*, a person with perfect information about the present and the future, able and willing to make complicated calculations and not prone to psychological biases.

Behavioural economics accepts different set of assumptions about the human nature: limited (imperfect) knowledge of the decision maker, limited ability to process the knowledge and searching for

Figure 2 **Pred matrix**

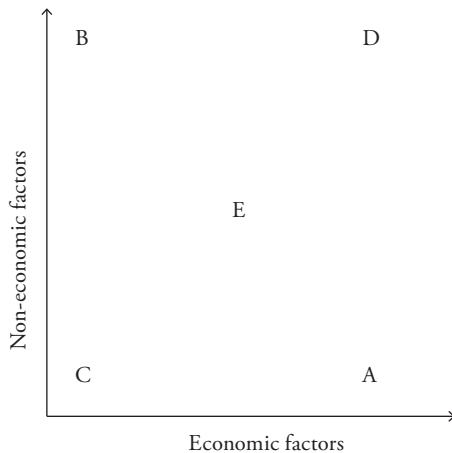


Source: A. Pred [1967], *Behaviour and Location: Foundations for a Geographic and Dynamic Location Theory*, Lund:, The Royal University of Lund, Department of Geography Studies in Geography, "Human Geography", Part I, p. 76.

satisfactory result rather than optimal. Decision maker who behaves in line with those assumptions is purposefully called *homo satisfaciendus*.

*Homo satisfaciendus* is the concept of decision maker used in the bounded rationality model created by H. Simon [1955], which is fundamental for behavioural economics, including behavioural location theory. In the model it is assumed that the decision makers do not aim to maximise utility from choice made

Figure 3 **Hurst matrix**



Source: M.E. Hurst [1974], *A Geography of Economic Behaviour, An Introduction*, London, Prentice Hall.

(making an optimal decision) but rather search for a good enough (satisfactory) option and once they find such an option they also stop search. In practice, it means that typically a decision maker will accept the first location that meets his minimum criteria, the so called aspiration level and will not even check alternative locations. Simon points out that people may use so called heuristics, which are decision making patterns simplifying their decision problems but he did not elaborate on it.

The gap has been filled by D. Kahneman and A. Tversky [1975] who singled out three famous heuristics: availability, representativeness and anchoring. H. Godlewska-Majkowska [2016] argues that such heuristics are used to assess location virtues of places which a location decision maker had visited within business location decision making process.

The bounded rationality model has served as the basis for the A. Pred [1967] behavioural matrix, which linked information availability, investor’s information processing ability and profitability of chosen business location. The general rule is that the more information (or information processing ability) one has, the more profitable location one chooses, *ceteris paribus*. An adapted version of Pred matrix is presented in Figure 2. Point A represents *homo oeconomicus*, who has perfect information and perfect ability to use it, so he or she will choose the optimal location. All other decision makers make suboptimal decisions and the extreme is reached in point B, where the decision maker has little information and low ability to process it, so he or she will choose a poor location that may result in a loss.

M.E. Hurst [1974], introduced non-economic dimension into location choice and presented graphically in the Hurst matrix. As can be seen on Figure 3, point D may be understood as choosing the optimal location with respect to economic

Table 2 Elements of Lynch's mental maps

| Element   | Description   |
|-----------|---|
| Paths     | Ways which a person uses to move in a city, more or less frequently, or even potentially. For many people paths are the main element of their maps. Example: streets, walkways.                 |
| Edges     | Linear elements which are not seen as path by a person but something which divide space, for example walls. Edges help people set own borders in large space but are less important than paths. |
| Districts | Moderate or large fragments of a city which have common characteristics according to a given person.  |
| Nodes     | Important communication points which can be entered. Examples: junctions or crossings.  |
| Landmarks | Objects which serve as reference points but are not entered by people. Examples: hills, castles.  |

Source: own elaboration on the basis of K. Lynch [1990], *The image of the City*, Massachusetts, MIT Press.

and non-economic factors (typical for *homo oeconomicus*), while point E is a satisfactory solution (typical for *homo satisfaciendus*).

### Perception of space

People perceive space in subjective ways and it has consequences for business location decisions. According to K. Kuciński [2015], everyone has his own geosophy, understood as personal, emotional attitude towards various places, which influences location decisions. A similar concept has been developed by D. Lowenthal [1961], who claims that everyone has his own personal geography, which can be treated as the image of the world dependent on one's place of residence, experience and knowledge. One can know almost nothing about distant places and at the same time may know more about his local area than can be found in the encyclopaedia.

In 1960 K. Lynch published *Image of the City*, the book in which he dealt with how people memorise and perceive the element of urban space. He asked participants of the research to draw a map of city in which they lived and the maps naturally were different in terms of detail level and included objects. Lynch concluded that *there seems to be a public image of any given city which is the overlap of many individual images*, which in our view is close to stating that through unique subjective perspectives stereotypes of locations

emerge. Table 2 presents major elements of mental maps singled out by Lynch.

The need for further research on mental maps is acknowledged by R. Domański [1995] who thinks that *humans have a certain mental image of the environment surrounding them and we do not have a comprehensive answer to the question, how images of space are shaped in human brains*.

The work of P. Gould from 1966 may be seen as a development of Lynch's concept of mental maps [Gould, 1966]. The title of his work – *On mental maps* – is slightly misleading, because they are rather maps of preferences, as indicated by B. Domański and H. Libura [1986]. Gould saw the importance of the spatial perception for spatial decisions: *many of the decisions that men make seem to be related, at least in part, to the way in which they perceive the space around them and to the differential evaluations they place upon various portions of it*. The role of such perceptions could be even larger due to increasing role of soft location factors: *thus, in view of the decline in importance of the more traditional factors, might not the decision to locate be increasingly related to the image an area has in the minds of a few key people?*

In his study Gould [1960] asked geography student from four US universities to sort the attractiveness of 48 states as residential areas, according to their personal taste and preferences. He was aware that while student may have strong

opinions about the best and the worst places, in the middle positions of the ranking it will be difficult to sort the states. Anyway, Gould considered this shortcoming tolerable. Answers differed between universities, which suggest that the assessment of other states depended on one's place of residence. An example of application of preference maps to business location decision can be found in the work of W. J. Meester and P.H. Pellenbarg [2006], who created such maps for cities in the Netherlands.

Table 3 we present the timeline of behavioural location theory development. It is worth noting that the most important concepts for this theory have been developed in years 1955-1975. Then a slowdown in behavioural location theory development has taken place, despite acceleration of behavioural economics research in general. In the last 20 years four Nobel prizes were awarded to behavioural economists and their works are in minimal or no extent used in location theory. For example, we are not aware of studies examining the framing effect (described by D. Kahneman and A. Tversky) in the context of location choice.

## Contemporary relevance of behavioural location theory

To find out relevance of behavioural location in contemporary science and location decision context in particular authors have performed standardized literature review basing on Boolean search of selected scientific databases between 14-21<sup>st</sup> of July 2017. Authors used Boolean search operators such as AND, NEAR and PHRASE to:

- identify scientific articles containing both search phrases looked for in one document (for operator AND);
- phrases looked for in proximity one to another of 50 words (for operator NEAR);
- and exact phrases looked for (for operator PHRASE).

No quotes around phrases linked with operators AND and NEAR were used. For identification of English language articles authors used EBSCO, Emerald and Goole Scholar databases. For identification of Polish language articles authors used BazEkon, CEJSH (The Central European Journal of Social Sciences) and also Google Scholar, which has been used

Table 3 **Important contributions to the behavioural location theory**

| Author          | Year    | Contribution  |
|-----------------|---------|---|
| H. Simon        | 1955    | General model of bounded rationality, which applies to business location decisions as well.   |
| K. Lynch        | 1960    | Research on mental maps – highlighting that the importance of elements in space is subjective, because people remember different elements.                                    |
| P. Gould        | 1966    | Maps of spatial preference – Gould examined residential places attractiveness, but his method can be applied to business location theory as well.                             |
| Pred            | 1967    | Pred adapted the bounded rationality model to location theory, which resulted in the Pred matrix. Moreover, he described the imitation effect in business location decisions. |
| G. Tornquist    | 1970    | Pointing out the diminishing role of transport as a location factor and highlighting the need for personal contacts and information exchange between entrepreneurs.           |
| M. Hurst        | 1974    | Proposed the Hurst matrix and indicated that business location decisions are influenced by economic and non-economic factors.   |
| F.E.I. Hamilton | 1975(?) | Indicating the importance of broadly understood environment as circumstance of location decision which is a result of a compromise between various groups of interests.       |

Source: own elaboration on the basis: J. Brdulak [2011], *Lokalne uwarunkowania kulturowe w lokalizacji przedsiębiorstw*, w: K. Kuciński, *Glokalizacja*, Warszawa, Difin, s. 44-89; I. Fierla [1987], *Lokalizacja przemysłu*, Warszawa, PWE; B. Domański, H. Libura [1986], *Geograficzne badania wyobrażeń, postaw i preferencji*, „Przegląd Geograficzny”.

**Table 4 Scientific relevance of behavioural location theory in location decision context**

| No. | Key word Boolean operators                            | EBSCO  | Emerald     | Google Scholar | Baz-Econ | CEJSH |
|-----|---|--------|-------------|----------------|----------|-------|
| 1   | behavioural economics AND location theory             | 2      | 3501        | 282 000        | N/A      | N/A   |
| 2   | behavioural economics NEAR location theory            | 27 005 | 759         | 90 900         | N/A      | N/A   |
| 3   | behavioural economics location theory PHRASE          | 22 451 | 3 514       | 0              | N/A      | N/A   |
| 4   | bounded rationality AND location decision             | 4      | 5 943       | 112 000        | N/A      | N/A   |
| 5   | bounded rationality NEAR location decision            | 9 952  | 1 448       | 52 400         | N/A      | N/A   |
| 6   | bounded rationality location decision PHRASE          | 7 016  | 5 951       | 0              | N/A      | N/A   |
| 7   | heuristics AND location decision                      | 192    | 3 145       | 184 000        | N/A      | N/A   |
| 8   | heuristics NEAR location decision                     | 9 079  | 805         | 141 000        | N/A      | N/A   |
| 9   | heuristics location decision PHRASE                   | 6      | <b>3156</b> | 0              | N/A      | N/A   |
| 10  | ekonomia behawioralna AND teoria lokalizacji          | N/A    | N/A         | 800            | 0        | 47    |
| 11  | ekonomia behawioralna NEAR teoria lokalizacji         | N/A    | N/A         | 37             | 0        | 0     |
| 12  | ekonomia behawioralna teoria lokalizacji PHRASE       | N/A    | N/A         | 0              | 0        | 0     |
| 13  | ograniczona racjonalność AND decyzja lokalizacyjna    | N/A    | N/A         | 684            | 0        | 0     |
| 14  | ograniczona racjonalność NEAR decyzja lokalizacyjna   | N/A    | N/A         | 21             | 0        | 0     |
| 15  | ograniczona racjonalność decyzja lokalizacyjna PHRASE | N/A    | N/A         | 0              | 0        | 0     |
| 16  | heurystyki AND decyzja lokalizacyjna                  | N/A    | N/A         | 61             | 0        | 0     |
| 17  | heurystyki NEAR decyzja lokalizacyjna                 | N/A    | N/A         | 3              | 0        | 0     |
| 18  | heurystyki decyzja lokalizacyjna PHRASE               | N/A    | N/A         | 0              | 0        | 0     |

Source: own study, based on Boolean search performed between 15<sup>th</sup>-21<sup>st</sup> of July 2017: EBSCO, Emerald, Google Scholar, BazEkon, CEJSH, accessed between 14<sup>th</sup>-21<sup>st</sup> of July 2017.

as common reference point of quantified number of articles in both English and Polish language. Results of authors' research are presented in Table 4.

Number of English language articles referring to or deriving from behavioural economics in location theory identified and authors' further investigation on their content proves that behavioural economics theory in decision location is scientifically relevant, described and discussed phenomenon, whereas Polish language contribution to it is rather modest. The key Polish contributors developing behavioural economics theory within context of location decision in recent years are: E. Klepczarek and K. Zieliński [2012], J. Brzezicka and R. Wiśniewski [2013], J. Godłów-Legiędz [2013].

## Conclusion

We surveyed the most important contributions to the field of behavioural location theory and conclude that this sub-field of behavioural economics slowed down its development in recent decades, contrary to behavioural economics as a whole. In this way a large research gap emerged, because in the last 20 years four Nobel prizes for behavioural economists were awarded (G. Akerlof, R. Shiller, D. Kahneman & A. Tversky and this year – R. Thaler), but findings of the laureates are applied to behavioural location theory in a minimal extent. Therefore, we expect that a growing number of scholars will try to fill the gap in the coming years, for example by conducting experiments.

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