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Accessibility and its many dimensions: why 'geographical accessibility' alone is not enough

Muukkonen, P. ^{1,*}

¹ *Department of Geosciences and Geography, University of Helsinki, Finland*

* Corresponding author

<https://orcid.org/0000-0003-4222-1349>

Department of Geosciences and Geography

Faculty of Science

University of Helsinki

P.O. Box 64

00014 University of Helsinki

FINLAND

petteri.muukkonen@helsinki.fi

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Accessibility and its many dimensions: why ‘geographical accessibility’ alone is not enough

Petteri Muukkonen ^a

^a *Department of Geosciences and Geography, Faculty of Science, University of Helsinki, Finland*

* Correspondence: petteri.muukkonen@helsinki.fi; Tel.: +358-50-448 9195; Department of Geosciences and Geography, Faculty of Science, P.O. Box 64, 00014 University of Helsinki, Finland

Abstract

In geography, ‘accessibility’ is often used as shorthand for geographical accessibility (distance, travel time, travel cost, and related spatial measures). Yet *accessibility* carries different established meanings across disciplines, so geographers should name *geographical accessibility* explicitly when that is what is meant. This discussion paper argues that geographical accessibility is only one dimension of a broader, multidimensional accessibility, and that conceptual precision matters for research quality and equality-oriented planning. To address a recurring measurement bias, in which what is easy to quantify can dominate what is studied, the paper proposes a practical ten-dimension framework for analysing services and activities. The dimensions are: geographical, physical/technical, temporal, informational, economic, administrative, cultural-attitudinal, skills-related, mental, and social accessibility. By treating geographical accessibility as one dimension among others, researchers can better identify where barriers accumulate, for whom accessibility fails, and why ‘nearby’ does not always mean ‘possible’.

Keywords: accessibility; geographical accessibility; multidimensional accessibility; services; inequality

1. Introduction

Accessibility is one of the key concepts and analytical perspectives in geography, with a long tradition of definitions and theoretical debate (Hansen 1959; Geurs and van Wee 2004). Here, I argue that geographers should more often speak of **geographical accessibility** rather than referring generically to ‘accessibility’. The shorter form has become established as in-discipline jargon; yet it can narrow debate and, at worst, obscure the fact that accessibility is always a multidimensional whole, one that produces inequality and is shaped by multiple mechanisms (Muukkonen et al. 2022; Virmasalo and Hasanen 2022).

Moreover, when ‘accessibility’ is used as a short, unspecified concept, it can also narrow discussion between disciplines. When, in geography, we speak of accessibility as if it were by default geographical accessibility, we risk sidelining other fields’ established meanings and debates, for instance in accessibility studies, planning, and architecture (physical accessibility); social and health care research (access to services and help-seeking); administrative sciences and legal scholarship (institutional rights and gatekeeping); and communication and information studies (findability and comprehensibility of information). If we do not name geographical accessibility as one dimension in its own right, we not only oversimplify the phenomenon but also weaken interdisciplinary dialogue. We create a situation in which ‘accessibility’ appears, in the language of geography, already explained, even though for many other fields it remains a contested, normative, and practical question.

In this framing, I draw on a ten-dimension model developed in my group’s previous studies (Muukkonen et al. 2022, pp. 19–27; Muukkonen 2023; Virmasalo and Hasanen 2022), which divides accessibility into ten dimensions: (1) geographical, (2) physical and technical, (3) temporal, (4) informational, (5) economic, (6) administrative, (7) cultural-attitudinal, (8) skills-related, (9) mental, and (10) social (see Figure 1). Figure 2 complements this by illustrating accessibility as an individual decision-making process: whether to travel, or not travel, to a service or activity, and consequently whether to use it or not. Importantly, many everyday trips are multimodal (e.g., walking or cycling combined with public transport), which means that ‘accessibility’ is shaped by how well the whole trip chain works rather than by any single leg (Muukkonen 2023a). Relatedly, promoting active travel depends on walkability and cyclability, including safe, well-lit routes with good surfaces and low exposure to noise and air pollution, and routes that work for people with mobility constraints

(Muukkonen 2023a). A closely aligned ten-dimension typology was originally proposed in the context of physical activity promotion and co-development with municipal actors; it likewise emphasises that geographical approaches such as proximity and GIS-based indicators alone are not sufficient (Muukkonen et al. 2022; Virmasalo and Hasanen 2022). The shared idea is that location and travel time alone, that is, geographical accessibility, do not explain for whom a service, action, or place is usable, and why.

From this perspective, Figure 2 can also be read as a schematic of perceived accessibility: people do not respond to a map or an index directly, but to their own judgement of how easy it is to reach desired destinations using modes they can realistically use. In their recent review, Negm et al. (2025, p. 11) propose a deliberately focused definition: perceived accessibility is ‘the perception of how easily one can access their desired destinations using a (range of) specific mode(s)’. This framing fits the point of Figure 2: even when the physical environment is unchanged, perceptions shaped by skills, information, attitudes, past experiences, and resources can shift the likelihood that geographical accessibility turns into actual use (see Muukkonen et al. 2022). It also helps specify what is at stake in geographers’ jargon: if we say only ‘accessibility’ but operationalise only geographical accessibility, we may end up measuring what is measurable while missing what actually drives use and non-use (Negm et al. 2025).

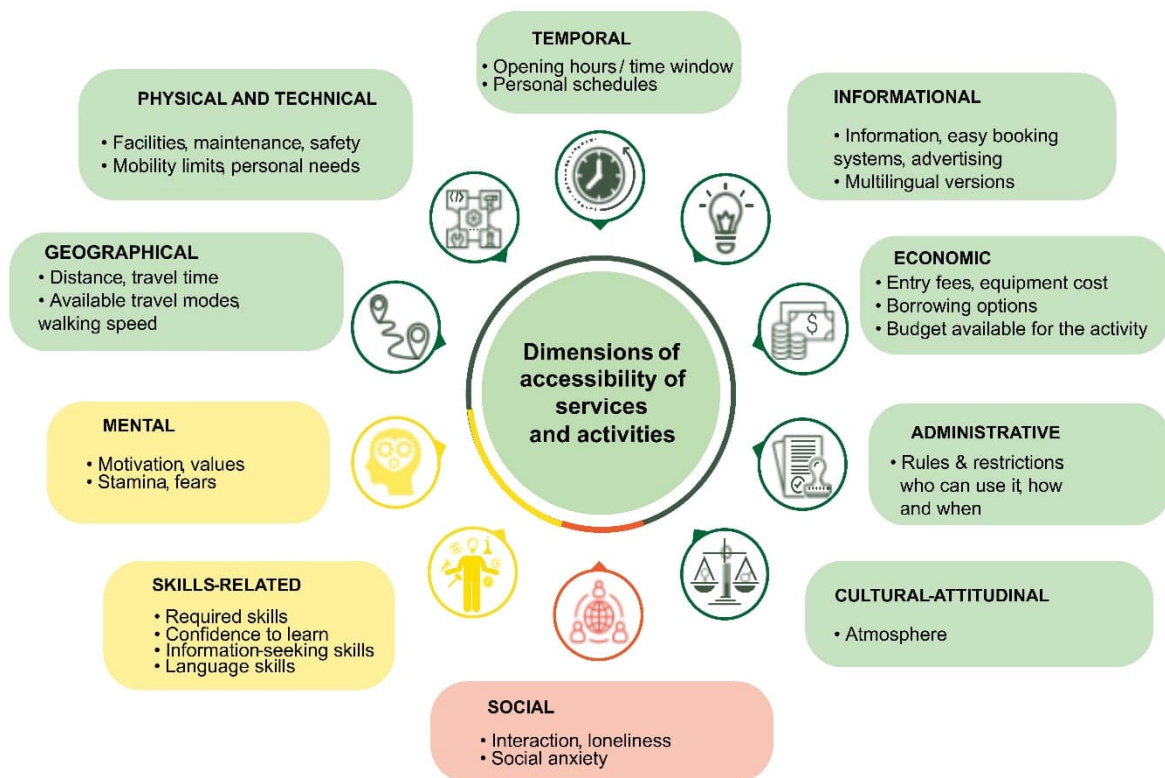


Figure 1. A ten-dimension model of accessibility used to structure the paper and to distinguish geographical accessibility from other, interacting dimensions: physical/technical, temporal, informational, economic, administrative, cultural-attitudinal, skills-related, mental, and social accessibility. The colour-coding of the dimensions corresponds to Figure 2, where the same dimensions are positioned in an individual's decision process of whether to go to, engage with, or otherwise use a service or activity. The figure is adapted and modified from the original by Muukkonen et al. (2020, 19).

Alt text: A graph presenting accessibility as a central concept surrounded by ten labelled dimensions: geographical, physical/technical, temporal, informational, economic, administrative, cultural-attitudinal, skills-related, mental, and social accessibility.

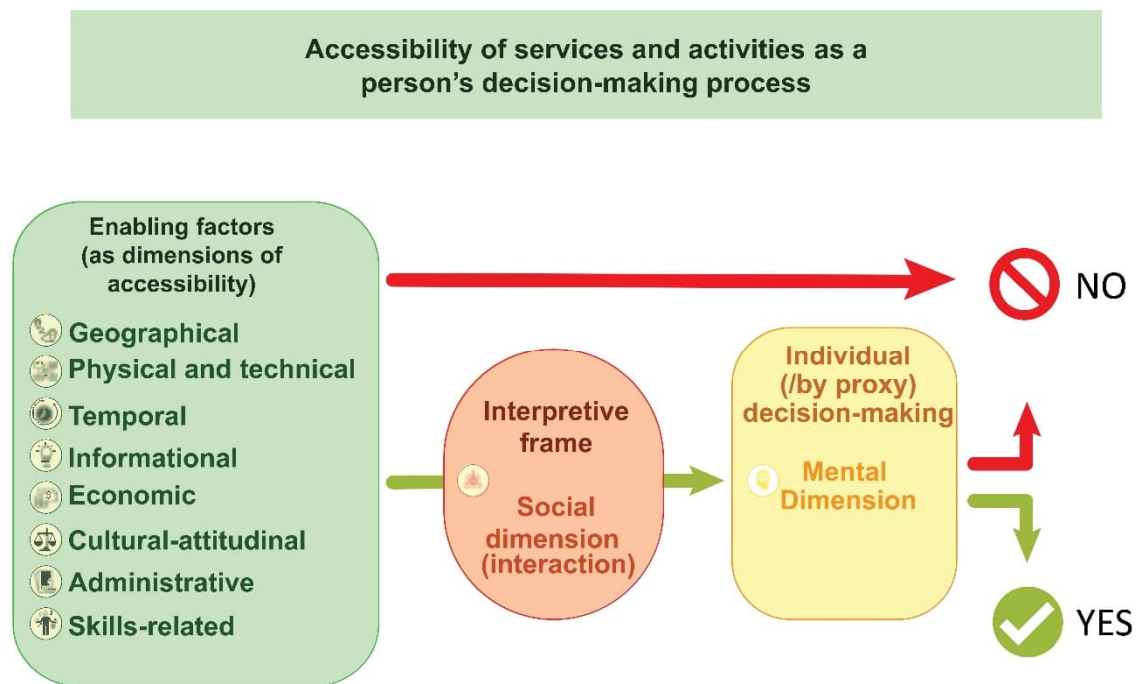


Figure 2. Schematic of an individual's decision process of whether to go to, engage with, or otherwise use a service or activity, structured through the same ten accessibility dimensions as in Figure 1. The colour-coding of the dimensions in Figure 1 is based on the colours used here. The figure is adopted and translated from the original by Muukkonen et al. (2020, 27).
Alt text: Flowchart depicting an individual's decision process about using a service or activity. The diagram shows successive checks and barriers aligned with ten accessibility dimensions (geographical, physical/technical, temporal, informational, economic, administrative, cultural-attitudinal, skills-related, mental, and social), illustrating how multiple factors can lead to use or non-use.

2. "Accessibility" as professional jargon in geography

In geography, accessibility has a long research tradition, from classic formulations linking accessibility to land use and regional development (Hansen 1959) to contemporary GIS-based approaches (Geurs and van Wee 2004). Yet in contemporary geography talk, 'accessibility' often slips into meaning primarily *spatial* accessibility: distance, travel time, network measures, and GIS-based zones. This is not wrong as such. Geographical

accessibility is central, and geography has produced strong methods specifically for measuring it (Geurs and van Wee 2004). The problem arises when the short form starts to function as the default: accessibility = geographical accessibility. In interdisciplinary work it also quickly becomes clear that ‘accessibility’ does not open up to other fields in the same way, which further underscores the need for precise concepts (Muukkonen 2023).

This reveals the risk of discipline-internal language: we write and speak as if we were talking only to other geographers. Then ‘accessibility’ can be left undefined, because we assume a shared understanding. At the same time, we forget that the concept also lives outside research, in decision-making, planning, and everyday talk, and that for different actors accessibility means different things: barrier-free access, affordability, comprehensible communication, safety, a welcoming atmosphere, the right to use a space, and so on (Muukkonen et al. 2022; Virmasalo and Hasanen 2022; Semm and Palang 2010). Semm and Palang (2010) make this point sharply by arguing for a broadened concept of accessibility that is not delimited to territorial access, and by framing accessibility through an accessibility-inaccessibility opposition that foregrounds exclusion, segregation, and the production of social identities. They further suggest understanding accessibility as the creation of ‘spaces for communication’, emphasising that conflicts and competing meanings are not noise around accessibility but part of what accessibility is (Semm and Palang 2010).

This is also where the transport-geography literature on perceived accessibility provides a concrete bridge between spatial measures and lived reality. A recent review concludes that perceived accessibility is often ambiguously defined and measured, and that instruments may lack robust validation for capturing what ‘accessibility’ and ‘perception’ mean at the individual level (Negm et al. 2025). It also notes that commonly used ‘objective accessibility’ indicators embed researcher choices and assumptions, and therefore recommends the more transparent term ‘calculated accessibility’ for conventional GIS-based measures (Negm et al. 2025).

3. Dimensions of accessibility for services and activities

The ten-dimension model developed by Muukkonen et al. (2022) was created to examine equality in opportunities for an active lifestyle and in sport and exercise facilities, but its value is not limited to sport. The model makes visible mechanisms that can be identified in almost all everyday services and activities, including health and social services, education, libraries and cultural services, public transport, the use of urban space, digital services, commercial everyday services, and arenas of civic activity and participation.

In geographical research on services and activities, the dimensions of accessibility help us avoid two familiar biases. The first is place bias, the assumption that locating a service nearby solves accessibility. The second is measurement bias, the assumption that what is easy to measure (travel time, a kilometre threshold, an accessibility index, etc.) is also what matters (Geurs and van Wee 2004; Virmasalo and Hasanen 2022). The dimensions are therefore not just ‘more variables’. They open up the question of how accessibility is built as a process in which enabling factors, institutional delimitations, and experiential interpretations intertwine. Similar criticism has been raised, for example, in sport and exercise services: interventions that rely solely on building facilities do not necessarily reduce barriers to their use, especially for marginalised people and those in disadvantaged positions (Muukkonen et al. 2023; Salmi et al. 2023; Virmasalo and Hasanen 2022).

A growing body of transport-geography research makes a similar point using the language of perceived accessibility. In their review, Negm et al. (2025) conclude that perceived accessibility is often ambiguously defined and measured, and that many instruments lack robust validation for capturing what accessibility and perception mean at the individual level. Their synthesis is especially relevant for geographers because it shows a systematic mismatch between calculated (often called ‘objective’) accessibility indicators and how people actually experience their possibilities. Perceived accessibility may be shaped by spatial knowledge, travel skills, attitudes, and adaptation to local circumstances. In other words, even good GIS-based accessibility measures can fail to translate into use if people do not perceive destinations as reachable or suitable, while low calculated accessibility can coexist with high perceived accessibility when people have resources or strategies that compensate (Negm et al. 2025).

Negm et al. (2025) also underline that perceived accessibility research is not a vague ‘soft add-on’ to transport geography, but a way to make our explanations more realistic. They summarise evidence that perceived accessibility is linked to travel behaviour and to questions of social inclusion, while also noting that these links remain underexplored and methodologically challenging. For an opinion piece that argues for more precise terminology, the takeaway is practical: if the goal is to explain why people do or do not use services, the key variable is not only the location of opportunities but the perceived ease of reaching desired opportunities using feasible modes, under real-life constraints (Negm et al. 2025). This also aligns with our findings that, in every dimension of accessibility (see Figures 1 and 2), there may be barriers that people perceive before deciding whether to travel to a service or activity (see Salmi et al. 2023).

My practical proposal for geographers has two parts. First, every study should define which dimension of accessibility, or which combination of dimensions, it examines, and it should distinguish geographical accessibility from the others. Second, studies should use the dimensions for systematic mapping: what barriers or enablers are associated with the service or activity, and for whom do they accumulate? In practice, alongside quantitative data (e.g., GIS data sets), we often also need qualitative data, an examination of administrative practices, and an analysis of user experiences.

4. Ten dimensions of accessibility

Below, I illustrate the ten dimensions of accessibility using one running example: a public library and its services. The point is to show how what geographers often call ‘accessibility’, as shorthand for geographical accessibility, expands into a wider set of barriers and enablers when the same library is viewed through each dimension.

4.1 Geographical accessibility

Geographical accessibility means that the library can be ‘accessible’ on a map, but the question is whether people can realistically reach it from their everyday locations with feasible modes. This is why measures often need door-to-door (origin-to-destination) thinking

rather than a single leg of a trip. A short car trip may be a long trip chain by bus; evening services, transfers, safety en route, and mobility constraints shape whether the library is reachable. In addition to minutes and metres, the indicator can be travel cost or even CO₂ emissions. If geographers call this simply ‘accessibility’, we risk shrinking the whole issue to what our models can count.

4.2 Cultural-attitudinal accessibility

Cultural-attitudinal accessibility means that the library may be close, but does it feel ‘for me’? Norms of silence, surveillance, staff attitudes, and narrow representations in posters or collections can make some groups feel unwelcome. A single exclusionary encounter can turn proximity into avoidance. If ‘accessibility’ is treated as a spatial metric, these cultural signals that shape library use are ignored.

4.3 Social accessibility

Social accessibility means that the library is often used through social ties, for example going with a friend, a parent, a study group, or a community event. Without someone to go with, newcomers may not enter, even if the building is nearby. Who is present shapes the social feel of the space and signals who it is ‘for’. If ‘accessibility’ is reduced to geography, this relational layer disappears.

4.4 Physical and technical accessibility

Physical/technical accessibility means that the library may be nearby, but steps at the entrance, heavy doors, poor lighting, or lack of quiet spaces can make it unusable. In digital library services, ‘access’ may hinge on devices, authentication, interface design, and assistive-tech compatibility. If we label all this ‘accessibility’ but measure only travel time, we miss the barriers that start at the door, or the login screen.

4.5 Temporal accessibility

Temporal accessibility means that the library can be close yet out of reach if opening hours mirror a 9–5 rhythm, if evening or weekend hours are scarce, or if visiting requires a long uninterrupted time window. This can place shift workers and others living outside a ‘normal’ daily rhythm in a particularly difficult position. Queues for help desks or booked study rooms also turn proximity into waiting. Treating ‘accessibility’ as only geographical hides how time schedules decide who can actually use the library.

4.6 Information accessibility

Information accessibility means that the library’s services may exist, but users need to find and understand them, for example how to get a card, book a room, access e-books, or request accessible formats. If instructions are only in complex language, only online, or poorly signposted in the building, ‘access’ fails before travel begins. Calling this simply ‘accessibility’ invites a GIS-only answer to an information problem.

4.7 Economic accessibility

Economic accessibility means that the library is often ‘free’, yet costs still matter, such as travel fares, printing fees, fines, or the need for a laptop, headphones, or data to use digital materials. For some, even small repeated costs or the risk of penalties is a barrier. If geographers’ ‘accessibility’ means only distance, we overlook how money quietly filters who uses the library.

4.8 Administrative accessibility

Administrative accessibility means that the library can be next door but still gated by rules, such as proof of address, age limits, fines, bans, booking systems, or municipal membership deciding e-resource access. ‘One click’ reservations can also be exclusionary if they presume digital IDs and constant connectivity. When ‘accessibility’ is used as shorthand for geography, these institutional gatekeepers vanish from view.

4.9 Skills-related accessibility

Skills-related accessibility means that using library services may require language skills, form-filling, digital literacy, and knowing ‘how the system works’ (catalogues, holds, e-books, self-service machines). Even navigating the building and service logic is a skill. If geographers speak only of ‘accessibility’ and mean travel time, we miss the competence barriers that decide who can benefit from the library.

4.10 Mental accessibility

Mental accessibility means that even when the library is easy to reach, anxiety, shame (‘I don’t belong here’), fear of asking for help, or worry about fines can block use. Complex service paths (cards, IDs, machines) can exhaust people before they start. This is where other barriers translate into ‘I won’t go’.

5. What follows for geography?

Geographers’ strength lies in the ability to make visible spatial structures, networks, and regional differences. Precisely for this reason, it is important that talk about accessibility does not collapse into only what we are best able to measure, even though measurement has been central to the field since classic accessibility research and its land-use connections (Hansen 1959; Geurs and van Wee 2004). If we use the word ‘accessibility’ without clarification, we may unintentionally reinforce a way of thinking in which equality is pursued primarily by moving points on a map, even though the barriers may lie in information, skills, rules, prices, time, or social meanings (cf. Muukkonen et al. 2022, 12–17; Muukkonen 2023; Muukkonen et al. 2023; Salmi et al. 2023; Virmasalo and Hasanen 2022).

Finally, I want to emphasise that geographical accessibility remains an important object of study in geography, but conceptually and practically it is only one form: one dimension of accessibility. When geographical accessibility is named precisely as its own dimension and other dimensions are brought alongside it, we gain a more accurate language for inequality, a better evidence base for planning, and a more honest picture of why ‘nearby’ does not always mean ‘possible’.

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Declaration of competing interests

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Petteri Muukkonen: Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review and editing.

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Microsoft Copilot was used for language improvements.