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

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Abstract

More precise terminology in geographical scholarship is needed when scholars refer to distance-, travel-time-, travel-cost-, or network-based accessibility. They should explicitly use the term *geographical accessibility* rather than accessibility in general. The argument is not that existing accessibility research ignores temporal, social, economic, informational, or perceived dimensions. On the contrary, these dimensions are well established in several literatures. The problem addressed here is narrower: in geographical writing and planning-oriented analysis, the short term *accessibility* can still be used as if geographical accessibility were its default meaning, thereby blurring the distinction between what is measured and what enables use in practice. Drawing on transport-geographical definitions and on a ten-dimension heuristic developed in physical-activity research, the text distinguishes geographical accessibility from other conditions that shape whether services and everyday destinations can actually be used. It shows how barriers may intersect or reinforce one another. For example, a nearby service may remain unusable if information is unclear,

opening hours are unsuitable, costs are prohibitive, or the social atmosphere is unwelcoming. The aim is to stimulate discussion on clearer conceptual language and more transparent operationalisation, not to replace existing accessibility theory with a new universal framework.

Keywords: accessibility; geographical accessibility; perceived accessibility; multidimensional accessibility; service access; spatial analysis

1. Introduction

Accessibility is a key concept and analytical perspective in geography, transport studies, planning, health research, disability studies, information studies, and several other fields. In transport and geographical research, it has long been defined in relation to the ease of reaching opportunities, from Hansen's (1959) classic formulation of accessibility as the potential for interaction to later work that distinguishes land-use, transport, temporal, and individual components (Geurs and van Wee 2004). This text starts from a modest but important terminological point: when geographical scholars refer specifically to distance-, travel-time-, travel-cost-, or network-based accessibility, it is clearer to call this *geographical accessibility*. The shorter term *accessibility* is useful, but it becomes imprecise when it is used as the default label for only one way of operationalising access.

This distinction matters because accessibility is not owned by geography. Other fields have developed partly overlapping concepts under different names: affordability in debates on financial access, barrier-free and universal design in physical accessibility, help-seeking and access to care in health research, digital inclusion in information and communication studies,

and institutional gatekeeping in administrative and legal scholarship. Much of this work is already familiar to accessibility researchers. The risk addressed here is therefore not that the wider literature lacks multidimensional thinking, but that geographical shorthand may make spatial operationalisation appear to stand for the whole phenomenon. Such shorthand can weaken interdisciplinary dialogue and make it harder to determine whether a study measures accessibility as such or one specific dimension of it.

A ten-dimension heuristic has previously been used in work on equality in physical-activity opportunities (Muukkonen et al. 2022, pp. 19–27; Virmasalo and Hasanen 2022). The dimensions are geographical, physical/technical, temporal, informational, financial, administrative, cultural-attitudinal, skills-related, mental, and social accessibility. They should be read as a practical checklist of possible barriers and enabling conditions, not as a new general theory of accessibility or as mutually exclusive components. The dimensions overlap: for example, a travel fare is financial, but it is also part of a geographical trip; safety can be a physical, social, and perceived condition; and opening hours connect temporal accessibility with institutional rules. This overlap is precisely why the dimensions are useful as a heuristic: they help researchers ask which part of accessibility they are measuring and which parts may remain unmeasured.

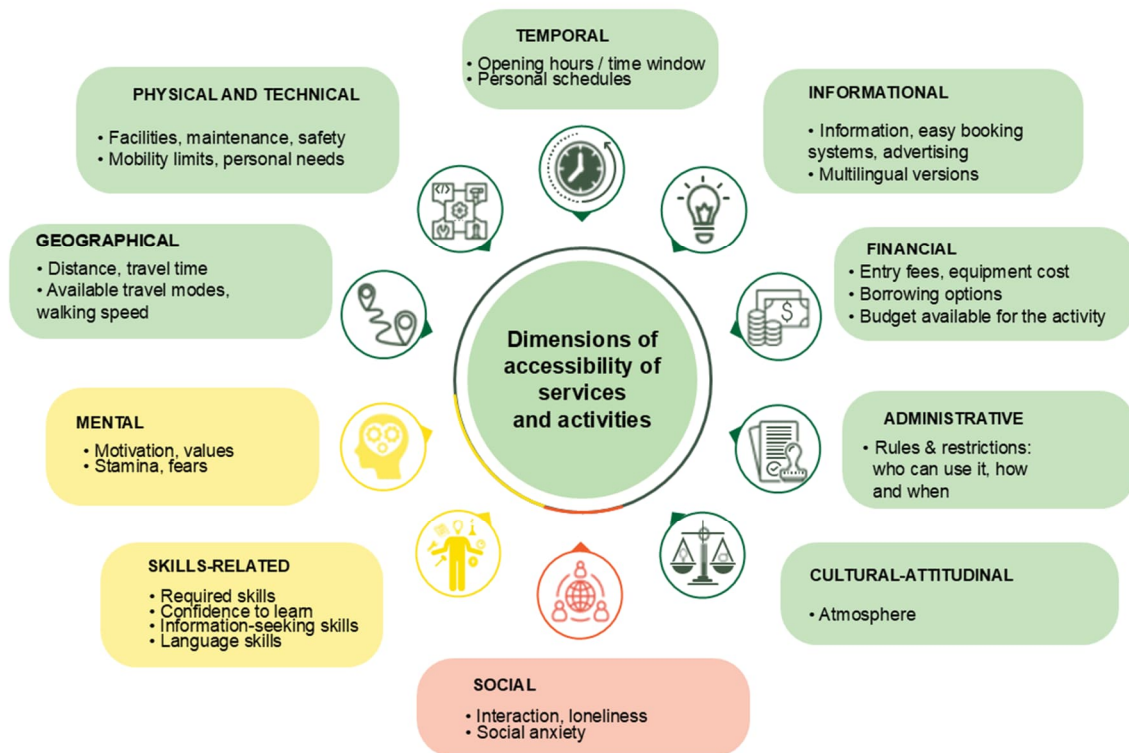


Figure 1. Ten dimensions of accessibility, presented as a heuristic for identifying barriers and enabling conditions that may shape whether a service, place, or activity can actually be used. Geographical accessibility is one dimension among others and is not synonymous with accessibility as a whole. The original figure was published in Muukkonen et al. (2022) under a CC BY 4.0 licence.

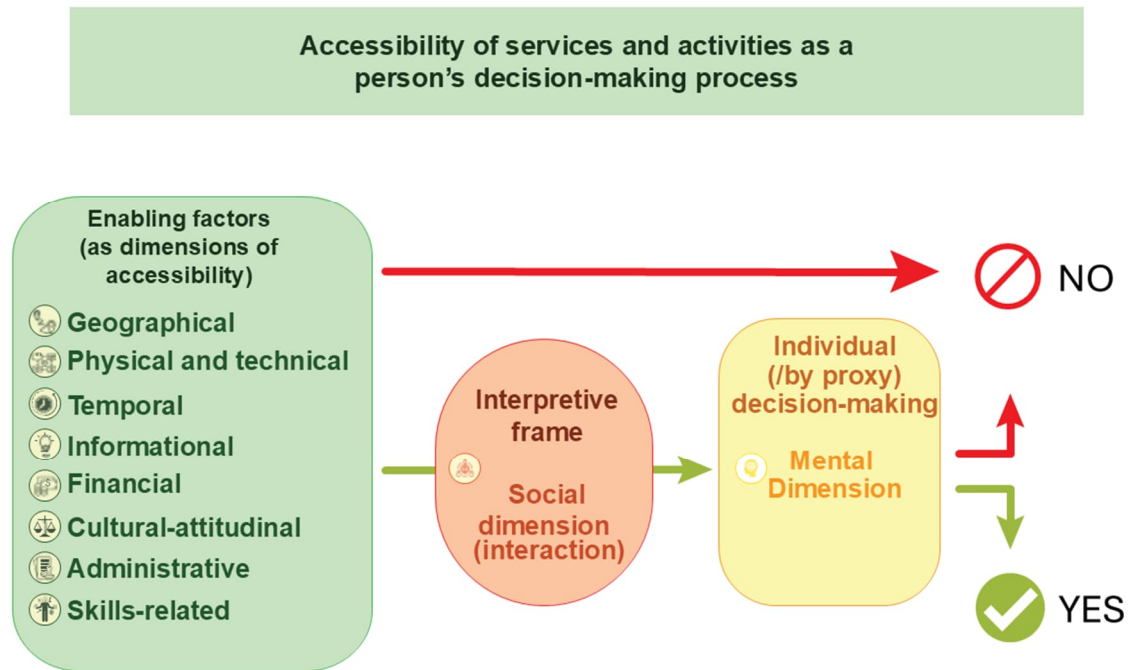


Figure 2. Accessibility as a situated process of becoming able to use a service or activity. The figure illustrates how different access conditions may combine before, during, and after a journey or service encounter. It is not intended to depict a linear decision-making model, but to show how geographical, temporal, financial, informational, social, and other dimensions may interact in practice. The original figure was published in Muukkonen et al. (2022) under a CC BY 4.0 licence.

This discussion also connects to recent work on perceived accessibility. Negm et al. (2025, p. 11) define perceived accessibility as ‘the perception of how easily one can access their desired destinations using a (range of) specific mode(s)’. Their review shows why terminology matters: calculated indicators do not translate automatically into perceived ease of use, and perceptions may be shaped by spatial knowledge, travel skills, attitudes, adaptation to local circumstances, and past experiences (Negm et al. 2025). The point is not that GIS-based indicators are unnecessary. Rather, calculated geographical accessibility

should be named as such, and its scope should be made transparent when the research question concerns actual use, perceived possibility, or equality of access.

2. “Accessibility” as professional jargon in geography

In accessibility research, it is already common to recognise more than location and travel time. The literature addresses temporal constraints, individual resources, affordability, perceived accessibility, social inclusion, and many other aspects (Geurs and van Wee 2004; Negm et al. 2025). The issue raised here is therefore not that the field has ignored these dimensions. It is a question of language and operationalisation: when a study measures distance, travel time, cost, or network impedance, calling the result simply ‘accessibility’ may obscure the fact that it captures one calculated, geographical dimension. More precise wording helps avoid the slippage from *measured geographical accessibility* to *accessibility as such*.

This is especially important in interdisciplinary work. In planning practice, public services, digital environments, disability studies, and health care, accessibility may refer to affordability, barrier-free design, comprehensible information, safety, institutional rights, or social inclusion. Semm and Palang (2010) make this point by arguing for a broadened concept of accessibility that is not limited to territorial access and by framing accessibility through an accessibility–inaccessibility opposition that foregrounds exclusion, segregation, and the production of social identities. Such work does not make geographical accessibility less important. It shows why geographical accessibility should be named as one dimension within a wider vocabulary rather than left as an unmarked default.

This is also where 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 defined and measured ambiguously, 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. A heuristic for distinguishing accessibility dimensions

The ten-dimension heuristic was originally developed to examine equality in opportunities for an active lifestyle and in sport and exercise facilities (Muukkonen et al. 2022; Virmasalo and Hasanen 2022). Here, it is applied more broadly to everyday destinations and services: places people may need or wish to reach, use, or participate in. These may include public services, shops, workplaces, education, cultural facilities, health care, social activities, family and friendship networks, civic participation, and digital or hybrid services. Public transport is not treated here as a destination type, but as part of the transport system that can enable or constrain access to such destinations.

The heuristic is most useful when it prevents two forms of slippage. The first is not the naïve claim that proximity alone always solves accessibility; few accessibility scholars would argue that. Rather, the risk is that planning and research communication may overemphasise proximity because it is visible, mappable, and politically actionable. The second is measurement slippage: travel time, a distance threshold, an accessibility index, or a network

impedance may be easy to calculate and may therefore be presented as if it captured all relevant access conditions (Geurs and van Wee 2004; Negm et al. 2025). The dimensions therefore operate as a diagnostic checklist. They help researchers state what their measure captures, what it leaves outside, and what additional evidence may be needed when the research question concerns actual use or equality-oriented planning.

Perceived accessibility research clarifies why this diagnostic work matters. If the aim is to explain why people do or do not use destinations, the key issue is not only the location of opportunities but also the perceived ease of reaching them with feasible modes under real-life constraints (Negm et al. 2025). This does not make perceived accessibility identical to the ten dimensions used here. Rather, perceived accessibility cuts across them: financial costs, information, opening hours, social comfort, skills, and prior experiences can all shape whether a destination is perceived as reachable and suitable.

The practical proposal is therefore limited and procedural. First, studies should define which dimension or combination of dimensions they examine and, when appropriate, distinguish geographical accessibility from other access conditions. Second, when a geographical measure is used, the manuscript should state the metric and its scope, for example whether it captures distance, travel time, travel cost, door-to-door trip chains, modal constraints, time of day, or other impedance factors. Third, when the research question concerns use, non-use, inclusion, or equality, geographical measures may need to be complemented with evidence on rules, information, skills, costs, experiences, or perceptions.

4. Ten dimensions of accessibility

The following section illustrates the heuristic through one running example: a public library and its services. The example is not intended to list all possible barriers or to rank the dimensions. It shows how a single destination can be examined through several access conditions, and how a geographical measure can be necessary but insufficient when the question is whether different people can actually use the service.

4.1 Geographical accessibility

Geographical accessibility refers here to the ease of reaching the library from relevant origins, such as home, work, school, or other everyday locations, using available transport modes. It may be measured as network distance, travel time, travel cost, the number of transfers, or another impedance indicator. A door-to-door approach is often preferable because the relevant trip is not only the in-vehicle or in-network segment: it may include walking to a stop, waiting, transferring, parking, locking a bicycle, and the final walk to the entrance. Multimodality matters because the same library may be close by car but difficult to reach by bus, easy to reach by bicycle in summer but not in winter, or reachable during the day but not in the evening. Naming this as geographical accessibility does not solve all problems of access. It simply makes the scope of the measure explicit before other dimensions are considered.

4.2 Cultural-attitudinal accessibility

Cultural-attitudinal accessibility means that the library may be close, but users may still ask whether it feels ‘for me’. Norms of silence, surveillance, staff attitudes, and narrow representations in posters or collections can make some groups feel unwelcome. The issue is

not only whether a user is physically allowed to enter, but whether the service environment communicates recognition, legitimacy, and respect. A single exclusionary encounter can turn proximity into avoidance. In contrast, small signals of inclusion, such as multilingual materials, diverse collections, or staff trained to support different users, can lower the threshold of use. 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 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 the place is ‘for’. Social accessibility also concerns the routines through which people learn to use a place: a child may become a library user through school visits, an older resident through reading circles, or a migrant through community guidance. Conversely, loneliness, lack of local networks, or previous experiences of being out of place can make a nearby service socially distant. 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 the lack of quiet spaces can make it unusable. In digital library services, ‘access’ may depend on devices, authentication, interface design, and

compatibility with assistive technologies. If all this is labelled ‘accessibility’ while only travel time is measured, the analysis misses the barriers that start at the door or at the login screen.

4.5 Temporal accessibility

Temporal accessibility means that the library can be close yet out of reach if opening hours follow a 9-to-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 conventional daily rhythm in a particularly difficult position. Queues for help desks or booked study rooms also turn proximity into waiting time. Treating ‘accessibility’ as only geographical hides how time schedules shape who can actually use the library.

4.6 Information accessibility

Information accessibility means that the library’s services may exist, but users still need to find and understand them, for example how to get a library card, book a room, access e-books, or request accessible formats. If instructions are available only in complex language, only online, or are poorly signposted in the building, ‘access’ can fail before travel begins. This is especially important for services that are not self-evident: digital lending, interlibrary loans, study rooms, makerspaces, events, language cafés, or support for reading difficulties may remain invisible unless information is actively made findable and understandable. Calling this simply ‘accessibility’ invites a GIS-only answer to an information problem.

4.7 Financial accessibility

Financial accessibility means that the library may be formally free of charge, while use can still involve costs such as travel fares, printing fees, fines, replacement charges, or the need for a laptop, headphones, a data connection, or other equipment. For some users, small repeated costs or the risk of penalties may be enough to discourage use. These costs can also interact with geographical accessibility: a more distant library may be financially inaccessible if reaching it requires paid transport.

4.8 Administrative accessibility

Administrative accessibility means that the library can be next door but still be gated by rules, such as proof of address, age limits, fines, bans, booking systems, or municipal membership rules that determine access to e-resources. ‘One-click’ reservations can also be exclusionary if they presume digital IDs and constant connectivity. Administrative rules define who is eligible, under what conditions, and through which procedure; they can therefore turn an apparently public service into one that is easier for some users to claim than for others. The problem is not that rules are unnecessary, but that they are part of accessibility and should be analysed as such. 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 skills, digital literacy, and knowledge of ‘how the system works’ (catalogues, holds, e-books, self-service machines). Even navigating the building and its service logic is a skill. These skills are often assumed rather than stated: users are expected to know what a

reference desk is, how to ask for help, how to reset a password, or how to move between physical and digital collections. If support is available only to those who already know how to request it, the barrier remains partly hidden. If geographers speak only of ‘accessibility’ and mean travel time, they 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 begin. Mental accessibility is therefore not simply an individual attitude; it is often produced through earlier encounters with institutions, accumulated uncertainty, or repeated experiences of not understanding how a service works. It is also where other barriers translate into ‘I won’t go’: unclear information, social discomfort, administrative rules, or low digital confidence can become a felt threshold that prevents use despite geographical proximity.

5. What follows for geography?

Geographical research is especially strong in analysing the spatial distribution of opportunities, the transport networks that connect origins and destinations, and the regional inequalities that result from uneven land use and mobility systems. These strengths remain essential for accessibility research. The caution is that a geographical strength can become a conceptual shortcut if calculated spatial indicators are presented without specifying their limits. If the word ‘accessibility’ is used without clarification, research and planning may

unintentionally privilege interventions that improve proximity, travel time, or network connectivity while overlooking barriers related to information, skills, rules, prices, time schedules, social relations, or perceptions (cf. Muukkonen et al. 2022, pp. 12–17; Muukkonen 2023; Muukkonen et al. 2023; Salmi et al. 2023; Virmasalo and Hasanen 2022).

The conclusion is therefore not that geographical accessibility is too narrow to be useful. It is indispensable. The point is that it should be named and delimited when it is the dimension being measured. Doing so makes room for other forms of evidence when the research question concerns actual use, perceived possibility, or equality of access.

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

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