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## Generating car dependence: exploration of factors from a multidimensional perspective in Lombardy, Italy

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This work addresses the following topic(s) from the Call for Contributions:  
(Please check at least one box)

- Placemaking to integrate urban spaces and mobility
- Promoting sustainable mobility choices in metropolitan regions
- Governing responsible mobility innovations
- Shaping the transition towards mobility justice
- System analysis, design, and evaluation
- other: \_\_\_\_\_

### Extended Abstract

#### Problem statement

The extensive use of cars, while convenient for many users, produces harmful outcomes on wider parts of society and the environment. Its contribution to climate change or respiratory diseases, high energy consumptions or large urban spaces occupation represent some of the outcomes why interest in traffic reduction is growing. This is an objective to many academics, practitioners and civil society groups, but still numerous individuals are not able or willing to release themselves from automobiles. Against, there is an intricate, pervasive and locked-in system applying which involves economy and lifestyle around cars (automobility, as Urry (2004) defined) placing difficulties for transitioning to different mobility options.

Car dependence, as a concept, navigates through the diversity of reasons supporting the societal reliance in automobiles. It is a phenomenon that involve territories, individuals and the practices that relate both (Mattioli et al., 2016), a process that covers many different facets. Researchers have explored the concept from different fields (e.g. transport, urban planning, geography, social sciences) while it is gaining momentum outside academia. However, framing car dependence is open to diverse interpretations: since the beginning of car dependence research, many authors pictured car dependence as something further than high car use, involving also the existence of transport alternatives or preference. This open interpretation especially emerges when operationalizing and assessing car dependence, as it can be approached from different dimensions (i.e. transport demand and supply, land use and form, accessibility, sociodemographic and personal opinions).

#### Research objectives

From car dependence dimensions, there's a wide range of indicators that potentially frames the term assessment, helping to develop car dependence as a latent construct. Partial perspectives, approaching car dependence from

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limited dimensions, bring forward a gap that could be addressed with clearer conceptual framework and combination of indicators from different fields. This would not only take into consideration the impact of different characteristics to car dependence, but also the potential impact that explicative variables might have between them in framing the phenomenon. This research assumes a division of car dependence dimensions into causes and effects. This is to say, the latter are formed indicators within accessibility, land use and form, transport supply and sociodemographic establish the conditions for generating car-dependent effects. These are represented by transport demand and personal opinion outcomes. This framework implies that car dependence it's not directly high car modal choice or stating strong attachment to own-vehicle, but outcomes of the phenomenon.

Acknowledging the multidimensionality of car dependence and the proposed framework, we introduce the following research question: Which are the more relevant factors producing car dependence from a regional context?

### **Methodological approach**

The aforementioned question will be addressed from an uncertainty and sensitivity analysis, looking for the variation in the outputs and the sources that generates them. We will select different transport demand indicators as car dependence outputs, looking for the impact that several car dependence causes imply. This is developed throughout a regional basis, expecting to approach car dependence indicators relationship with spatial patterns, understanding the phenomenon as rooted in territorial characteristics to some extent. This is developed through a case study covering Lombardy (Italy), one of Italy's main regions by size and population. It involves intense commuting, different socio-economic trends, and spatial densities: from Milan metropolitan and suburban area to more remote, mountain spaces. The scale of the study is based in over 1.400 transport analysis zones, coming from the regional transport survey form and data.

### **(Expected) results**

From this research, the outcome will be a set of statistically relevant variables that have a significant impact in the car dependence process. This will allow to reduce dimensionality for studying the phenomenon. Thus, those emerging car dependence generating factors, being highlighted, contribute on building towards a more systematic car dependence assessment. Even if the results are based in a specific context, the Lombardy heterogeneity and large extent allow exploring different car dependence spatial implications in the transition from urban to rural areas. Likewise, research results could be applied in other spatial contexts for car dependence studies or help standardizing criteria for harmonizing data gathering and acquisition. The relevance of a systematic assessment of car dependence also helps in two different ways: on one side, delivering insights for policy development as well as growing recognition and further diffusion of the concept.

### **References**

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