Measuring environmental impacts of commuting – Greening possibilities from the perspective of SMEs

Discussion of the objective

Urban sprawl, or in other words rapid expansion of residential areas around cities and towns may have significant consequences on environment. Low density residential zones use extensively land, which could be used for food production or as natural habitats, which reduces biodiversity. Suburban lifestyle (e.g., larger dwellings, individual heating, occasionally swimming pools, etc.) has a rather larger ecological footprint than urban (see for example Kovács et al., 2020 or Hardi et al., 2020, 2021). And as provision of dense, fast, and reliable public transport network is economically inefficient, individual motorised transportation is more frequent, causing further environmental impacts.

Transport sector is responsible for almost one quarter of greenhouse gas emissions and one of the major causes of air pollution in cities in Europe (European Commission, n.d.). This paper analyses environmental impacts of a specific transport activity, the commuting, defined as individual mobility between the homes and workplaces.

Methods and data used

The paper focuses on environmental impact of Hungarian small- and medium-sized enterprises (SMEs). SMEs are defined according to the recommendation of the Commission of the European Communities (2003) was used, namely enterprises with (1) less than 250 employees, (2) a turnover of less than 50 million euros or (3) of balance sheet total is less than 43 million euros.

The methodology used considers commuting as part of the business activity, thus environmental impacts of commuting will be also a subset. To measure environmental impacts of businesses activities an online corporate ecological footprint calculator was developed (see Szigeti et al., 2021).

Ecological footprint (EF) indicator represents the size of land needed for humanity at a given level of technological development to satisfy its needs and absorb waste generated (Wackernagel and Rees, 1996). EF can be considered as sound measure of (un)sustainability since it is easy-to-understand and relatively easy to determine the upper limit of sustainable consumption. The indicator consists of six land types, namely (1) built-up land, (2) forests, (3) grazing land, (4) cropland, (5) fishing ground, and (6) carbon. Land usage is standardised with equivalence factors (EQF) in globally comparable hectares (global hectares, gha). To taken into consideration of regional differences in productivity of land types a so-called yield factor (YF) is applied (Lin et al., 2018). Nevertheless, in the case of commuting accounts to carbon land usage due to the fuel consumption total EF. It is important to note, that it is a recurring critic of corporate EF calculations, that carbon land usage makes up vast majority of EF (Csutora, 2011).

The sample analysed consists of data on 72 surveyed SMEs classified into five groups based on a preliminary qualitative analysis (see Szennay et al., 2021). This analysis was conducted taking into consideration factors determining EF, so these groups are different from any statistical classifications (i.e., NACE in the EU or SIC in the USA). The groups are as following: (1) construction; (2) white-collar jobs; (3) production; (4) retail and/or wholesale trade; (5) transportation. Data was collected from three sources: (1) SMEs known from our professional network or from our university networks; (2) commercial and industrial chambers in Hungary were asked to send calls for survey to their member companies, and we participated in some of their events; and (3) students were asked to assist with our study (see Szennay et al., 2021).

Results and conclusion

In case of white-collar jobs, transport-related EF accounts on average for more than a quarter of the total corporate EF – determined vastly by commuting of employees. In manufacturing and in retail and/or

wholesale trade, travel may be motivated by the transport of various supplies and equipment, which requires the use of trucks. Accordingly, the share of transport-related ecological footprint is slightly higher, at 39.1 and 35.8 percent respectively. Within this, we cannot isolate the environmental impact associated with commuting, since vans may be used by employees to get to work. In the construction and transport sectors, the ecological footprint of transport is significantly higher, which is explained by the intensive use of machinery.

The paper contributes to research streams of both environmental and regional science in two ways. First, our results suggest that decisions on site locations may influence environmental impacts of commuting, since emissions are lower when total transport demand is lower (i.e., the workplace is closer) or when the location can be accessed easily by environmentally more responsible transport modes (i.e., public transport, bicycle, etc.). This aspect may be highly relevant in case of green field investments or where public transport does not exist. Secondly, lockdowns after COVID-19 pandemic proved that most white-collar works can be done remotely. In addition, minor business meetings or even conferences could be arranged online. This means, that total transport demand and its environmental impacts can be reduced. We suggest that firms should allow and motivate employees to work remotely, because (1) it embodies a higher level of trust between actors, since employer have less opportunities to monitor the work; (2) long-term costs may be lower, since after one-time cost of home office facilities (desk, chair, etc.) both corporate contributions to employee mobility and office rental cost could be reduced. Initiatives for active mobility (bicycle, running, etc.) may be mentioned as an another good option, since physical well-being of employees is beneficial for both employer (e.g., less sick leaves) and employee (e.g., better health).

Our results have, however, some limitations. First of all, the analysed sample is small, consists of only 72 SMEs, and not representative. Furthermore, the sample may be positively biased for two reasons: (1) participating in the research was voluntary and we could expect that environmentally more responsible SMEs had higher motivation to fill out our questionnaire; (2) calculations are based on the data provided by the SMEs itself, thus they could show rather lower estimations of real values. Therefore, environmental impacts of both the analysed sample and total population may be higher. Secondly, due to the sample size neither sectoral nor regional comparisons could be conducted.

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