To Build or Not to Build? Megaprojects, Resources, and Environment: An Emergy Synthesis for a Systemic Evaluation of a Major Highway Expansion

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ABSTRACT

Systems thinking and emergy synthesis are applied to transport studies in order to assess the socio-ecological convenience of a civil infrastructure: they are presented as comprehensive evaluation tools to go beyond conventional approaches like cost-benefit analyses, while geobiophysically including the overall resource consumption and the release of pollutants. Focusing on road systems, the massive expansion works on the mountainous section of Italian major highway A1 are chosen as a case study: such recently completed project is compared with the no-build option, considering alternative scenarios ranging from dedicated mobility policies using the old infrastructure to a partial modal shift to rail transport. Results are expressed in terms of total invested emergy, emergy per passenger-kilometer, and per ton-kilometer; data can be easily read also in terms of environmental, physical, and financial units. The convenience of the expansion works results highly questionable: the annually required emergy is shown to significantly increase: +24% for passengers and +51% for freight averagely (i.e., with or without services besides energy and material inputs). A key role is played by saved travelling time (computed as driving labor), able to mitigate but not to reverse the situation while representing a controversial accounting item. Instead, alternative uses and policies for the old infrastructure would all have yielded significant savings. In light of the above, some conclusions are drawn on societal priorities, including a critical reappraisal of time saving as an often unsustainable driver within a still mostly unquestioned ‘more and faster’ mantra. The need to support ecologically and strategically sustainable societal decision-making in the transportation sector is therefore framed in wider thoughts on economic planning and resource allocation, while envisaging a transformation towards a prosperous and sustainable future.

Citation
