

SCORAI poster abstract

### **Detecting indirect impacts of digital daily life**

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The digitalisation of daily life activities through automation often promises sustainable forms of consumption, offering energy efficiency gains, greater control for demand reduction, and a more integrated, decentralized, and flexible energy system. While much research investigates the direct impacts of automation technologies such as smart thermostats and other Internet of Things (IoT) devices on energy consumption, the indirect and systemic social impacts are often overlooked but can have significant consequences on sustainability.

This study explores the indirect impacts of automation through a mixed methods experimental research design, conducted as part of a UK living lab. Using a sub-sample of 10 households, the trial examined the use of smart robotic floor cleaners over one month. Detailed household activity-specific behavioural data, energy and time-use data, and attitudinal data were collected pre, during and post-trial. The range of methods used enabled measurements of the effects of floor cleaning automation not only on energy consumption but also on time-use, household roles and responsibilities, social norms, and practices.

The trial revealed significant societal and indirect impacts of automation: 1) a reduction in time spent planning and executing floor cleaning tasks, leading to multitasking and notable time rebound effects; 2) substantial shifts in household responsibilities, with the transition from traditional human-centric chores to automated tasks alleviating mental stress and family pressures. Positive shifts in household dynamics were discovered, along with the transferal of roles between household members based on their levels of technophilia; and 3) increased household tidiness and cleanliness, accompanied by heightened expectations for cleaning frequency.

While there were positive shifts in time management and household dynamics, these were accompanied by altered cleaning norms and increased energy consumption (depending on factors such as floor space and the digital skills of the users). These results provide insights into the underlying causal mechanisms of automation impacts and the complex interplay between technology, behaviour, and sustainable consumption practices. Findings emphasise the necessity of considering broader societal and behavioural effects when evaluating consequences and designing solutions to minimise negative impacts of digital automation on sustainable consumption.

Keywords: digital, time use, energy consumption, households, smart appliances, societal impacts