Modelling smart transit app take-up

Astrid Gühnemann, Simon Shepherd, Paul Pfaffenbichler

"Smart transit apps"- mobile phone travel applications that integrate journey planning, booking, payment and real-time traffic information - promise more personalised, complete services for public transport customers. Their aim is to ease the use of public transport, improve customer experience, and thus potentially attract new users, supporting a shift away from private car to more sustainable modes. This paper presents the development of a systems dynamics (SD) model that simulates the market penetration of such a smart transit app with the aim to identify the key factors that influence market diffusion, use and commercial success.

The core of the SD model is a Bass diffusion model that we extend by factors that influence adoption, retention and usage of the smart transit app as well as functionality to allow inactive users to re-engage. In the diffusion model, we explicitly model competition from other apps that offer similar functionality. In addition, a reinforcing feedback loop is implemented, assuming that new public transport operators will join the scheme and offer their tickets for sale through the app if they expect a sufficient number of potential new users, in turn increasing user satisfaction and use of the app. We added a further reinforcing loop around sponsors offering rewards for using the app: If the number of active app users increase, more sponsors can be attracted and more rewards offered, leading to higher user satisfaction and consequently more users. Commercial success is then measured as app profitability, calculated from revenues from advertising and ad-free app purchases depending on the number of active users minus costs of operation and marketing.

Our simulation results indicate that a high quality journey planner at release as well as a reward system are crucial to keep users engaged with the app and to achieve a positive return on investment. Adding competition significantly reduces the potential market penetration of the smart transit app, demonstrating the importance of adding such a structure to the diffusion model. Results show that it is crucial to gain a deeper understanding of how functionality and quality of the app in comparison to competitor apps as well as reward schemes will influence user satisfaction and consequently adoption, retention and use of the app.