Identifying key factors for the commercial success of an integrated journey planning and ticketing smartphone application

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Introduction

- A 'one-stop-shop' mobile phone travel application that integrates journey planning, booking, payment and real-time traffic information is being developed and tested in the Smarter Travel Solution (STS) project for West Yorkshire, UK.
- The aim is to support a shift away from private car travel by providing users with accurate information and easy payment methods for sustainable modes.
- The question is how many people will use the app and how its use will impact their travel behaviour.
- There is limited research on the diffusion of journey planning apps and on the factors influencing the uptake and use of them.

Journey Planning + Ticketing + User Engagement

Objectives

- Assess the potential impacts of this integrated STS app on travellers, society and businesses.
- Develop models that allow forecasting
  - A. *how many travellers will use the app*
  - B. how each individual app user will change travel behaviour
  - C. how this aggregate behaviour change will impact the transport system and society.

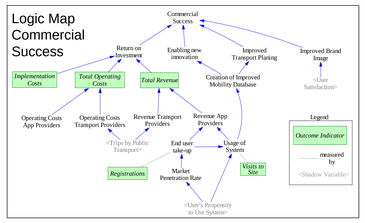
A) Diffusion and Usage + B) Individual Travel Behaviour Change due to STS App Usage → C) Impacts of STS App on Transport System and Society

Models for STS evaluation

- For A)
  - Identify the factors that influence the diffusion and use of the STS app
  - Use simulations to contribute to the development of a business model for running a commercially successful app

Evaluation Framework

- The purpose of developing an evaluation framework is to define the criteria & indicators against which the impacts of the app will be assessed
- Logic maps (AECOM & PTEG, 2012; Hills, 2010) are used to visualise interconnections between variables that influence the success of the STS app and help to identify measurable indicators for such variables, developed based on a feasibility study and discussions with partners



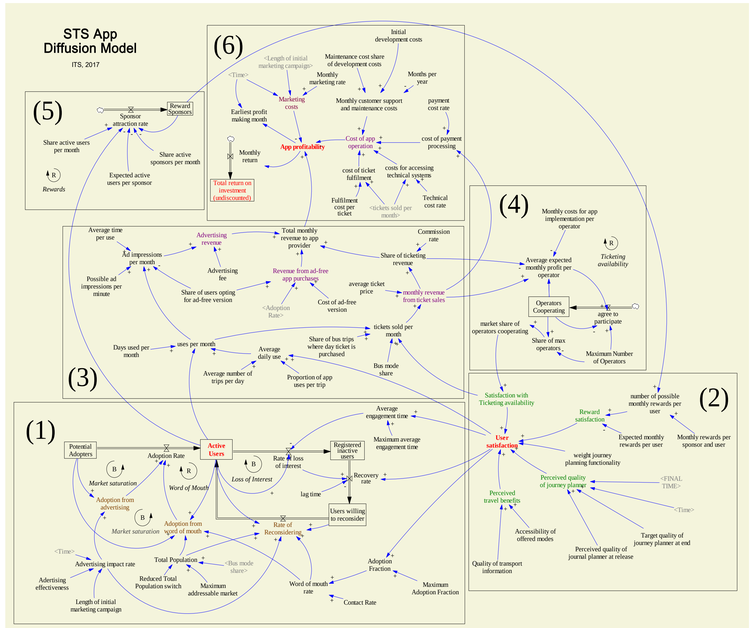
Objective	Outcome Indicator	Measurement
Commercial Success		
End user take-up	# registrations	quantitative, from system /
Usage of system	# number of visits to information services	quantitative, from system
Revenues (App Providers and Transport Operators)	£	quantitative, from system
Integration / implementations costs (public, private)	£	quantitative, from system
Operating costs (App Providers and Transport Operators)	£	quantitative, from system
Innovation potential	Successful creation of an improved database	qualitative,
Positive brand image	User assessment	qualitative, user reported
End user benefits		
End user mobility impacts	travel time savings increase in activity range increase in active modes (health)	quantitative, all estimated, based on self-reported intentions / surveys
End user satisfaction	scheduling effort, reliability of information, use experience	qualitative, from surveys / focus groups
End user costs	cost of car ownership £ cost of travel £	quantitative, all estimated, based on self-reported intentions

The Model

(1) Bass **diffusion model** with users becoming inactive and re-engaging
Based on Nel, (2016) a Bass diffusion model was extended by users becoming inactive after an average engagement time, using Little's Law. Further, inactive users are allowed to re-engage after a lag time, depending on user satisfaction

(2) **User satisfaction model** driving average engagement time
Four factors drive user satisfaction based on a set of desired functionalities of the STS app (Fausset, 2014): ticketing, journey planner, rewards and travel benefits. Average engagement time is driven by user satisfaction, in first simple approach directly proportional to it.

(3) **App usage and revenue** calculation
Monthly app usage is estimated based on assumptions on daily trips by active users and average use of app per trip. Revenue for app provider is generated from in-app advertising, purchases of ad-free version and a share of ticket sales revenue.



(4) Reinforcing Loop: **Ticketing availability**
New Operators will offer their tickets for sale through the app if they expect sufficient profit from doing so. This will increase availability of tickets, in turn increasing user satisfaction and use of the app, incentivising more operators to join the scheme.

(5) Reinforcing Loop: **Rewards**
We assume that users expect a certain number of rewards per month. Rewards are provided by sponsors. Their number depends on the active users of the STS app. If these increase, more sponsors can be attracted and more rewards offered, leading to a higher user satisfaction and consequently more users.

(6) App **operating costs and profitability** calculation
App profitability is calculated as the sum of monthly revenue minus marketing costs and costs of operating the STS app. Costs of operating such an app usually consists of costs of ticket fulfilment, cost of payment processing, customer support and maintenance costs, and technical costs.

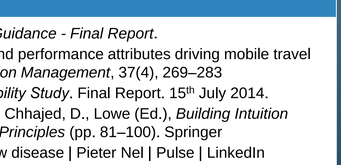
Results

- **Average engagement time & RoI**
  Positive RoI only achieved with average engagement time above 15 months (5 months excl. development costs) even in best case scenario with 100% user satisfaction.

- **Ticketing availability**
  Influence small as main operator (55%) included from start.
- **Reward satisfaction**
  High expectations for rewards lead to strong drop in user satisfaction and - through reinforcing loop - substantial reduction of active users and return on investment

Reward satisfaction scenario	Active Users	Return on Investment
Best Case (100% satisfaction)	386,942	168,752
1 monthly reward expected	378,527	-84,855
1 weekly reward expected	366,640	-248,491
1 daily reward expected	303,485	-577,494

- **Quality of journey planner**
  Available functionality and design of journey planner significantly influence number of active users. In worst cases with only 20% of quality throughout, users drop by a third.
  For a positive RoI, quality at release need to be at least 60%.



- **Combining satisfaction factors**
  Active users decrease considerably because adoption through word of mouth and willingness of inactive users to reconsider is dampened by lower satisfaction. This leads to a significantly delayed saturation.
  Earliest profit making month increases from month 4 in best case to 11 in combined and 13 with higher journey planner weight.

Conclusions & Outlook

- Quality of journey planner and rewards are key factors for user satisfaction & engagement time and consequently adoption, retention and use.
- More research is needed on how reward schemes and capabilities of the journey planner such as modes included, options for personalisation, quality of the user interface influence user satisfaction.
- App user surveys will be carried out to provide data for extending the user satisfaction model based on a technology acceptance model (TAM) (see e.g. Tsai, 2010) and/or S-O-R (Stimuli – Organism – Response) model (see Fang et al., 2017).
- The release of the app will provide data for the model calibration.
- A segmentation by type of users will be applied to explore variations in expectations and experiences and to model impacts on travel behaviour.

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