Technophilia as a driver for using advanced traveler information systems

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ABSTRACT

Advanced Traveler Information Systems (ATIS) provide comprehensive trip information for all modes of transport while considering the current traffic situation; however, impacts on travel choices are weak, which might be due to insufficient consideration of user characteristics. As a critical determinant of willingness to use, we propose and validate technophilia, an openness, interest and fascination towards information and communication technologies.

Drawing on data from a survey of 1300 Austrians, we describe willingness to use ATIS, and delineate target groups by socio-demographic characteristics. We establish validity of a technophilia measure consisting of seven survey questions. All questions constitute a common factor (construct validity). The technophilia measure can be distinguished from social norms and general technology-related values (discriminant validity). Technophilia is more pronounced among men, younger people, individuals with higher education and persons who frequently use the Internet for travel information or who frequently use an in-car navigation system. Among a range of potential determinants, technophilia is verified as an independent determinant of willingness to use ATIS (criterion validity).

The results suggest to pay particular attention to the technophilia dimension in ATIS user requirements. Technophiles may advocate ATIS in their social network. The applied seven questions provide a short and valid scale of technophilia which may contribute to customer segmentation or to explaining the acceptance of traveler information.

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1. Introduction

Advanced Traveler Information Systems (ATIS), understood here as online journey planners, have shown rapid technological development and market deployment in the last years. These systems typically (i) provide door-to-door information for all modes of transport, (ii) dynamically consider the current traffic situation in real-time, recommend routes and estimate trip durations and (iii) can be accessed pre-trip and on-trip via the Internet or mobile phone. Beyond route planning, sophisticated ATIS announce traffic jams, delays and stop-overs and calculate the costs and CO_2 emissions of a specific trip. Examples of advanced traveler information systems are *TravInfo/511* in the San Francisco Bay Area, *Transport*

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Direct in the UK, *Bayerninfo* in Germany, and *VAO* in Austria, introduced regionally as *AnachB* in 2009 and scheduled for nation-wide operation by 2015 (BMVIT, 2014).

By providing precise trip information, ATIS aim to support users in making more deliberated travel decisions. These systems not only intend to improve route choices and departure times, but should motivate users to shift from the car to other transport modes if these offer faster, cheaper, more reliable, or cleaner travel. Because of this objective for a modal shift, we limit the scope of this article to multimodal, current-generation ATIS like the examples mentioned above that feature comparative and dynamic information. Next generation ATIS are expected to actively suggest alternative travel options to the user. Building on the user's travel patterns as well as on pervasive information, future ATIS shall recommend alternative transport modes or destinations on short journeys, or propose virtual activities to substitute physical travel (Kramers, 2014; Weihong-Guo et al., 2008).

Both EU and national policy strategies call for an expansion of ATIS in order to improve transport efficiency and to enable seamless intermodal transport (BMVIT, 2012; EU, 2010). Saturation of per capita car travel demand in conurbations of developed countries ('peak car'; Metz, 2013) makes easy access to public transport more relevant. In conjunction with pervasive computing, Tuominen and Ahlqvist (2010) project ATIS to fundamentally increase fluency, safety and eco-efficiency in the transport system within the coming decade.

Despite those high expectations, experiences from the implementation of ATIS show rather weak effects on individual travel behavior. The shift in mode choice amounts to a maximum of 1% of all trips (Dziekan, 2004; Neuherz et al., 2000; Tsirimpa et al., 2007). However, travelers are generally reluctant to change their habitual transport mode (Eriksson et al., 2008; Cherchi and Cirillo, 2014). Mode inertia exists even with drastic events, as public transport strikes, train accidents, or even terrorist attacks fail to achieve substantial long-term mode changes (Murray-Tuite et al., 2014; Prager et al., 2011; van Exel and Rietveld, 2001). It is therefore hardly surprising that simply accessing an ATIS does not bring about fundamental modal shift.

The impacts of ATIS on departure time choice and route choice are somewhat stronger: About 5–15% of users adapt their departure time or route after they received travel information from an ATIS (Jou et al., 2005; Khattak et al., 1999; Prognos and Keller, 1999; Tsirimpa et al., 2007). Overall, ATIS are more relevant for unfamiliar, irregular journeys than for everyday, routine trips. More recent studies replicate these findings, but draw on qualitative, small-scale research designs (e.g., Skelley et al., 2013).

Previous studies attribute the impact of ATIS on travel choices to the user's interest in pro-actively accessing information: Habits inhibit the search for and the acquisition of new information (Fujii and Gärling, 2003; Kenyon and Lyons, 2003; Verplanken et al., 1997), thereby counteracting individual use of ATIS. In contrast, ATIS are preferred by people who are contemplating but not yet implementing behavioral changes and by people who are looking for alternative travel options (Farag and Lyons, 2008; Hope and King, 2005; Kenyon and Lyons, 2003). Previous positive experiences with travel information and its perception as helpful and useful increase the willingness to consult an ATIS (Farag and Lyons, 2010). Individual availability of information technologies (computers, the Internet, or cell phones) is positively related to ATIS awareness, and higher awareness leads to more frequent use (Goulias et al., 2004).

The present study extends the latter aspect, how affinity to information and communication technologies (ICT) translates to ATIS use. We argue that the individual attribute of technophilia, an openness, interest and fascination towards ICT, is a critical determinant for using ATIS. The purpose of this paper is twofold: First, we describe willingness to use ATIS among Austrians in the year 2010, and delineate target groups by socio-demographic characteristics. The second and main purpose is to validate and apply a short scale of survey questions capable of measuring technophilia. We show that technophilia is better suited than other individual attributes to explain willingness to use ATIS.

Thus, this paper focuses on the first step for inducing behavioral change by means of ATIS, the willingness to access travel information, setting the stage for the subsequent steps of users trusting the travel recommendations, implementing them even if they contradict previous experiences and personal convictions, and finally forming new travel habits which are upheld even in absence of ATIS access (Bonsall, 2004; Xu et al., 2010). While the results reported here refer to widely available, current-generation ATIS, the gatekeeper function of technophilia would equally apply to future-generation ATIS.

1.1. Attributes of target groups for ATIS

Different persons react to or neglect traveler information for different reasons; thus, tailoring ATIS user interfaces and information content to the needs of specific target groups might increase acceptance among the population and induce behavioral change. Affinity for or aversion to technology can be critical for the marketing of digital product innovations (Edison and Geissler, 2003). Previous studies characterize ATIS target groups by socio-demographic attributes such as gender, age, income, employment status and by mobility behavior (Jou et al., 2005; Mahmassani and Liu, 1999; Petrella and Lappin, 2004; Trommer et al., 2010; Vaughn et al., 1993), or by their use of ICT (Schröder, 2002; Wittowsky, 2009). Socio-demographic attributes influence the acquisition of travel information (Joh et al., 2011). Few studies apply psychological characteristics relating to technophilia, such as attitudes towards traveler information systems (Franken and Luley, 2005; Mehndiratta et al., 2000) or openness towards technology and innovation (Bottom et al., 2002; Schröder, 2002).

Repeatedly age is discussed as critical for understanding willingness to use ATIS. Similarly, young people are more interested in ICT (Edison and Geissler, 2003); they are more familiar with the everyday use of personal computers and cell phones