



Factors influencing Near Field Communication (NFC) adoption: An extended TAM approach



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ABSTRACT

Smartphone technology has had a huge effect on our society. One of the most recent mobile technology is NFC and projections show a huge development in the next years. Thus, there is a need for more understanding about the key success factors for both academics and professionals. The current research looks at the main adoption factors of NFC in France and uses a TAM-extended approach. Based on a PLS-SEM analysis of 320 smartphone users, results show that on the one hand, trust, social influence and technology availability influence positively perceived usefulness. On the other hand, security issues influence perceived ease of use. The model explains more than 30% of the variance of adoption of NFC technology, showing a strong support for the extended TAM model proposed.

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1. Introduction

Smartphone technology has had a profound effect on our society. The ability to communicate from almost anywhere has altered the way we live our lives as well as the way business is done. In developed countries, the smartphone penetration is up to more than 50% in general (more than 87% for South Korea, 67% for Norway, or 57% for United States of America – nfcworld, 2014¹), and the growth won't stop mainly because users are now eager to use that device in a lot of new ways, such as payment.

By 2019, \$142 billion will be spent using a mobile device in USA only (nfcworld, 2014), Recognized by professional institutions as the next technology (Forrester, 2012), many companies have started to develop Near Field Communication (NFC) solutions to answer that call (by 2015, 30% of all smartphones will be NFC-enabled – Harrop, Das, & Holland, 2014). NFC is now under deployment in many countries around the world including France, UK, USA, Poland, Japan, South Korea, Turkey, Singapore and the Netherlands, which is leading the race with a wide-scale deployment started in 2012.

But developing NFC's technology is a kind of paradox. On one hand, market surveys clearly show some reluctance from consumers to pay with their mobile, and the main reason is the perceived lack of security (Mallat, 2007). And on the other hand, companies are investing in the development of the technology, because they see a new range of business that could be generated with that device (Dulaney, 2008; Forrester, 2012).

This research wishes (1) to understand the reasons why users would accept and use that kind of technology in the near future in order to (2) offer to professionals the elements to focus on in the adoption of NFC. It focuses on a customer-point of view as it is undoubtedly one of the main factors of success in adoption (Dahlberg, Mallat, Ondrus, & Zmijewska, 2008). This study looks to answer to the following research question: *what are the factors influencing adoption of NFC technology in France?*

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¹ <http://www.nfcworld.com/2014/11/19/332824/us-mobile-payments-reach-142bn-2019/>, consulted December, 2014.

We therefore use an extended TAM approach (Davis, 1989) to understand the factors of adoption of the technology in a French context. The literature will highlight the notions of perceived security, trust, availability of the technology and social influence as key components of adoption.

The article is structured as follow. The first section will present the main theory (TAM) and its recent evolutions as well as the adoption factors in a NFC context. The second section will reveal the conceptual model and the hypotheses. The third section details the methodology and the results. Later on the discussion and implications are presented prior to the conclusion.

2. Near Field Communication

If NFC technology has several benefits for the industry and the user, it also has a number of challenges that have to be overcome. By NFC, we mean “a short-range wireless connectivity standard that uses magnetic field induction to enable communication between devices when they’re touched together, or brought within a few centimeters of each other” (mobile burn, 2014²).

Both professionals and academics worlds have started to explore the impact of NFC technology for individuals and industries. For authors such as Madlmayr, Langer, Kantner, and Scharinger (2008) or Csapodi and Nagy (2007), three main benefits can be enunciated: ease-of-use (built-in simple approach of physically bringing two communicating devices together), simple communication setup and the extremely low power consumption as potential benefits.

For professionals, benefits can be divided into two dimensions (GSMA, 2011). The first one is the socio-economic dimension. Through standardization, NFC technology will increase competition (reduce cost and infrastructure), allow greater consumer value and choice (price differentiation), increase financial transparency, improve public sector servicing (health or social security cards), and finally reduce carbon footprint (GSMA, 2011:25). The second one is the market dimension. With a standardization of NFC technology, the market could reduce the risk of fraud, increase economies of scale, reduce investment risk, or help the dematerialization process and finally be more open and transparent about successful business models (GSMA, 2011:42).

But NFC technology also comes with several challenges that need to be discussed. First, technical challenges include some of the vulnerabilities that NFC technology inherits from RFID technology such as Denial of Service (Madlmayr et al., 2008). Other technical challenges include issues of managing multiple applications on the same device and how to manage them over-the-air (Madlmayr et al., 2008). Second, the business challenges. They include devising the right business model to use with NFC technology and dealing with the various stakeholders involved (Benyó, Vilmos, Fördős, Sódor, & Kovács, 2009).

3. Literature review

3.1. Technology acceptance model

Many research have been conducted in information systems to understand, develop and predict the factors that could influence the adoption of a technology or an innovation by individuals. Studies have used established and vigorous models such as Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) and Theory of Planned Behavior (TPB) (Ajzen, 1991) for intention or models specialized in acceptance of technology such as Technology Acceptance Model (Davis, 1989), TAM 2 (Venkatesh & Davis, 2000) or Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003).

Evolving from TRA (Fishbein & Ajzen, 1975), a model that looked at the beliefs within an individual to explain adoption behavior (Morris & Dillion, 1997), the TAM, developed by Davis (1989), is one of the most influential research models for studying information technology acceptance or intention to use (Tan, Sim, Ooi, & Phusavat, 2012).

The model presents two determinants, namely perceived ease of use and perceived usefulness, of intention to use a technology. Perceived usefulness is the degree to which an individual believes that using a particular information technology will enhance his own performance (professional, personal). Perceived ease of use is the degree to which a person believes that using a specific information technology will be free of effort (Fig. 1).

The simplicity of TAM and the recent empirical support it has garnered has made TAM widely popular with IT/IS researchers (Rupanjali, Bhal, & Kapoor, 2013). But, as authors pointed out and in order to enhance its predictive power, there is a need for additional variables (Davis, 1989; Rupanjali et al., 2013; Venkatesh & Davis, 2000; Venkatesh et al., 2003).

Consequently, Venkatesh and Davis (2000) developed the TAM 2, in which they removed the attitude and added the subjective norm as well as other concepts such as image, job relevance or experience. Venkatesh et al. (2003) proposed a unified view of user acceptance of information technology where they introduce concepts such as social influence, gender, age, or effort expectancy. Venkatesh and Bala (2008) proposed a TAM 3 in the e-commerce context with the inclusion of trust and perceived risk on system use. More recently, Dutot (2014) integrated TPB, TRI and TAM to study the adoption of social media per generation and introduced new concepts in the TAM typology.

These add-ons to the inaugural model show that the TAM could be adapted in regards to the evolution of technology. In this research, we take the postulate that TAM needs to be completed to gather more efficiently the factors of adoption of NFC. As a starting model, and before presenting the main factors in NFC context, we position ourselves by using TAM and add to it the social influence defined in UTAUT (Venkatesh et al., 2003) as it was recognized relevant for a study on NFC (Chen & Chang, 2013).

² <http://www.mobileburn.com/definition.jsp?term=NFC>, consulted December 2014.

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