



24th DAAAM International Symposium on Intelligent Manufacturing and Automation, 2013

Technology Acceptance Model: Extension to Sport Consumption

Hafedh Ibrahim*

Higher Institute of Computer Science and Management, Rue Khemaies Elouini 3100 Kairouan, Tunisia

Abstract

This study look at antecedents to individual adoption of a fantasy sports website. The authors expanded Davis et al.'s Technology Acceptance Model (TAM) by taking into account both the affective as well as the cognitive dimensions of attitude and the hypothesized internal hierarchy among beliefs, cognition, affect and fantasy sport website. The results indicate that technology complexity leads to a higher Perceived Ease of Use (PEU). Moreover, it has been found that PEU positively impacts cognitive as well as affective attitude toward adoption of fantasy sport website. Attitudes in turns lead to use of fantasy sport league.

© 2014 The Authors. Published by Elsevier Ltd. Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Selection and peer-review under responsibility of DAAAM International Vienna

Keywords: Technology Acceptance Model; Perceived Ease of Use; Attitude; Technology Complexity

1. Introduction

Fantasy sports have been developed considerably in the last decade [1]. According to Drayer et al. (2010) [2], the average annual household income of fantasy participants is around \$94,000. Given the persistent growth in this industry, it seems crucial for academicians to better study consumers of fantasy sport technology. Above all, it is imperative to explore what variables influence participation in this innovative form of sports "spectatorship" [3]. The present research expands our knowledge of consumer behavior in this area using the Technology Acceptance Model (TAM) developed by Davis (1989) [4] as a hypothetical framework to investigate variables that affect individuals' adoption of fantasy sports website.

Davis et al. (1989) [5] demonstrate that the effect of overall attitude on information technology (IT) use was insignificant in forecasting future IT use. We can assume that one of the explanations was the potentially significant effect of cognition. In fact, according to the social psychology literature, attitude has mutually affective as well as cognitive dimensions [6] and a comprehensive understanding of the connection between attitude and behavior can be achieved through the severance of the affective as well as cognitive dimensions of attitude [7]. Within the IT

* Corresponding author. Tel.: +0021641253345.

E-mail address: hafedh.ibrahim@yahoo.fr

literature, Goodhue (1988) [8] and Swanson (1982) [9] have both identified that the distinction between affective and cognitive components has often been ignored in IT research. Therefore, in the suggested conceptual model we separate the two components of attitude.

2. Theoretical background

2.1. Technology Acceptance Model (TAM)

The TAM was developed by Davis (1989) [4] and Davis et al. (1989) [5] as a tool to expect the probability of an innovative technology being implemented within a group of firms. Anchored in the theory of reasoned action (TRA) [10], the TAM is established upon the assumption that technology acceptance can be elucidated by; (i) individual's beliefs, (ii) attitudes, and (iii) intentions. Accordingly, it should be possible to forecast potential technology adoption via the TAM when a technology is launched. Compared to the TRA, that is employed to enlighten person behavior across different circumstances, TAM is inclined to clarify further discrepancy in behavioral intentions in the investigation of technology acceptance. Davis (1989) [4] affirmed that researchers should explore additional factors that influence technology use. The TAM has principally been validated into utilitarian technology setting; on the other hand, relatively modest research has been performed on consumers' acceptance of hedonic IT. Fantasy sports websites are mainly leisure systems where users exploit their awareness of a particular sport to achieve competitive advantage so as to triumph a virtual sporting competition. Based on TAM research on consumers of comparable technologies, this investigation proposes that PEU is a driver for attitudes and real use of fantasy sports leagues.

2.2. Fantasy sports league consumption

From a customer standpoint, fantasy sport offers a varied experience of spectator sport exclusively unlike the habitual sport consumption experiences. It has generally been hypothesized as a complementary activity, which can enhance consumer interesting a sport and solidify levels of commitment. Fantasy sport is an innovative form of spectatorship [11], where individuals can have a big sense of control in co-producing outcome of their "sporting rivalry". This innovative form of sport spectatorship is deemed as a smart marketing opportunity for sport leagues [2]. It gives extra level of interaction between sport and spectators. Nevertheless, little practical or theoretical work has been carried out in the setting of fantasy sport, in spite of its significant development over the last years.

3. Research Model

Fig. 1 illustrates the model we tested in the current research. Since the TAM was conceptualized to elucidate the adoption of utilitarian IS, earlier research models based on this framework do not adjust straightforwardly to the area of hedonic driven service technology use [12]. Subsequently, this study uses an extended TAM to look at participants' acceptance of NFL fantasy football websites.

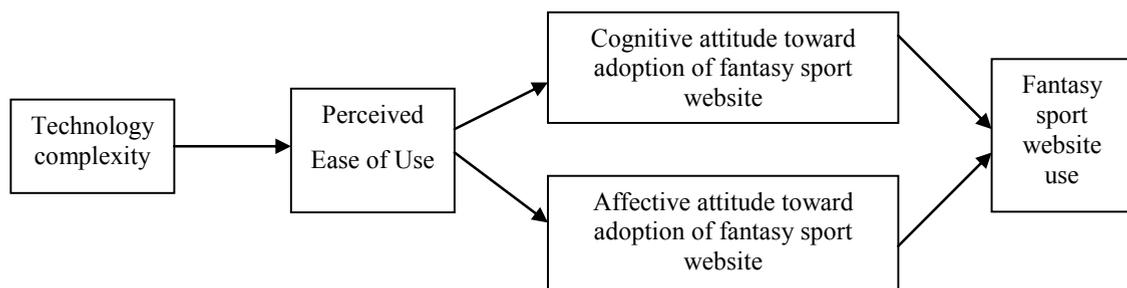


Fig. 1. The conceptual model.

The model tests the influence of technology complexity, PEU and attitudes as drivers for use of fantasy sport website or as called by Ha et al. (2007) [13] "online entertainment technology". Technological complexity is considered as an indispensable concept in the proposed framework, it represents the person's perception of the level

of intricacy involved in using a technology [14] and the principal barrier to the use of a new technology [15]. Past research demonstrated that technological complexity is significantly connected to PEU [16]. Thus, in the present model, this construct is supposed to have a significant influence on PEU.

Past TAM investigations have shown a positive correlation between PEU as well as perceived enjoyment of a leisure oriented technology service. In a similar study, Van der Heijden (2004) [17] established that PEU contributed to pleasure and adoptions towards a website. As well, Ha et al. (2007) [13] asserted that PEU had a significant and direct effect on behavioral intention toward a mobile gaming service. Given the different interactive roles of fantasy sports, it is crucial for participants to perceive the service as uncomplicated and easy to use. It is worth noting that; attitude is supposed to mediate the link PEU - fantasy sport website [18]. As reviewed earlier, the TAM arises from the TRA [10], which asserts that favorable attitudes produce positive decision concerning the behavior of interest. The significance correlation between attitude and behavior is well supported in the literature. Affective dimension of attitude indicates how much the individual likes the object of thought [19], even as the cognitive component shows the person's specific beliefs towards the object [20]. Given that a fantasy sports league is an extended form of sports spectatorship, person's attitude towards following the sport via NFL would be estimated to be positively connected to ease of use and real behavioral toward using computer technology to participate in a related fantasy sport. The significance of these mediating links, along with affective or cognitive attitude measures, is one of our major interests in this research.

4. Methodology

4.1. Data collection

Data were collected from students, who were familiar with fantasy sport, at University of Northern Colorado. Reports on the fantasy sports affirmed that participation in fantasy sports leagues is a male dominated behavior [21]. The investigation cracked down on NFL fantasy football since it is the most popular fantasy sports league in the USA. A total of 475 students (male=415, female=60) completed the questionnaires and were included in the data analyses.

4.2. Measurements

The questionnaire was based on measurement scales that have been validated and tested in previous researches. Appendix A shows all the measurement items that were used in the study. Perceived ease of use (PEU) was measured using two items five point Likert type scale following Davis (1993) [22]. Three items five point Likert type scale adapted from Son et al. (2012) [23] were used to assess the technological complexity, and based on the study of Yang and Yoo (2004) [24], we operationalize the affective and cognitive attitude using three items for each construct. Finally, use of fantasy sport website was evaluated based on the work of Yang and Yoo (2004) [24].

5. Data analyses

Data analysis was performed using a Structural Equation Modeling (SEM) to study the relationship between the constructs of the model that was analyzed using the Maximum Likelihood method. SEM has many advantages over path analysis or regression analysis, in particular when the manifest variables enclose measurement errors and the interesting relationship is between the latent variables [25].

5.1. Test of the measurement model

A Joreskog *reliability* index (1) for each construct was computed:

$$\rho_j = \frac{(\sum_{i=1}^{p_j} \gamma_{ji})^2}{(\sum_{i=1}^{p_j} \gamma_{ji})^2 + \sum_{i=1}^{p_j} \text{Var}(\varepsilon_i)} \quad (1)$$

All the coefficients are ranged from 0.74 to 0.85. These reliabilities denoted that the individual scales, when

taking as a group, performed fairly well in the model.

The *convergent validity* (2) of the construct is adequate, even though more than 50% of the variance is due to error. The coefficients are ranged from 0.53 to 0.67. These results offer evidence of convergent validity.

$$\rho_j = \frac{\sum_{i=1}^{p_j} \gamma_{ji}^2}{(\sum_{i=1}^{p_j} \gamma_{ji})^2 + \sum_{i=1}^{p_j} Var(\epsilon_i)} \tag{2}$$

We further examined the *discriminant validity* using the square root of the average variance extracted. As shown in Table 1, all square roots of the average variance extracted displayed on a diagonal of a correlation matrix are greater than the off-diagonal construct correlations in the corresponding rows and columns. This indicates that each construct shared more variance with its items than it shared with other constructs, thereby confirming the discriminant validity.

Table 1. Discriminant validity.

	Technology complexity	PEU	Cognitive attitude	Affective attitude	Fantasy sport website use
Technology complexity	0.90 ^a				
PEU	0.34 ^b	0.78			
Cognitive attitude	0.29	0.29	0.92		
Affective attitude	0.26	0.45	0.15	0.87	
Fantasy sport website use	0.22	0.35	0.28	0.27	0.86

^a **Diagonal:** (average variance extracted from the observed variables by latent variables)^{1/2}.

^b **Off-diagonals:** correlation between latent variables.

4.2. Test of the model

Researchers suggest a variety of measures to assess the fit between the theoretical model and the empirical data. In most cases, the goodness of fit is acceptable if the GFI is greater than 0.9, the AGFI is larger than 0.8, the RMSEA is inferior to 0.1, and the standardized chi-square is less than 5 [26].

Fig. 2 exposes the coefficients for the paths in the model. They showed the strength of the direct influence of an exogenous variable on an endogenous variable. The path coefficients were all found to be significant, so all the proposed relationships were significant.

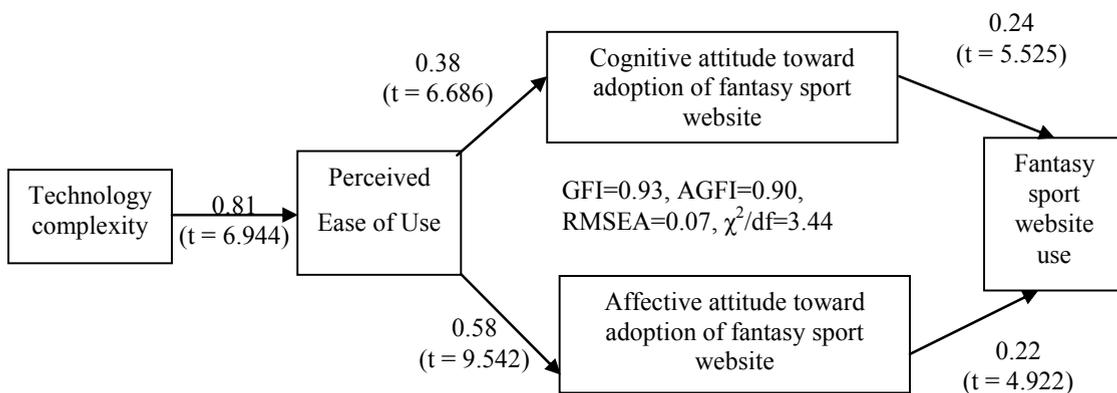


Fig. 2. Structural model and standardized parameter estimates.

The direct (D), indirect (I) and total (T) effects of all endogenous and exogenous variables in the model are reported in Table 2. Direct effects, are the influence of one variable on another that are not mediated by any other variable. Indirect effects are ones that are mediated by at least one other variable, and the total effects are the sum of direct and indirect effects.

Table 2. Direct, Indirect and Total effects of exogenous and endogenous variables.

	PEU			AA			CA			USE		
	D	I	T	D	I	T	D	I	T	D	I	T
TC	0.811		0.811		0.474	0.474		0.305	0.305		0.178	0.178
PEU				0.585		0.585	0.38		0.38		0.219	0.219
AA										0.222		0.222
CA										0.238		0.34

Note: Technology complexity (TC), Perceived Ease of Use (PEU), Affective Attitude (AA), Cognitive Attitude (CA), Fantasy sport website use (USE)

6. Discussion and conclusion

The present research adds to the body of sports marketing research that explores antecedents to online fantasy sports consumption by investigating the driver for attitudes as well as the real behavior in playing fantasy sport by extending the TAM [4]. While the TAM has been largely interested in clearing up utilitarian information systems adoption, fantasy sport on the internet entails a hedonic oriented technology system that is first and foremost geared to delivering cyber-consumers with agreeable distraction, rather than further economic benefits. Especially, the study designed to explore the influence of technology complexity and PEU on consumer attitudes and behavior.

The TAM results of the present investigation imply that task relevant along with domain specific variables was significant in elucidating amounts of variance in use of fantasy sport website. Nevertheless, it should be noted that football is the most popular fantasy sport and consequently results might have been diverse for other forms of fantasy league. For that reason, upcoming investigations must reproduce and extend this study to different forms of sport prior to any company conclusions can be drawn on the relation between the concepts of the study. Sport organizations could benefit from incorporating their sport with fantasy sport proposal by exploiting the corresponding effects shown by this paper concerning affective as well as behavioral levels of consumption. The employment of fantasy sport as a means to improve day to day activity and commitment to the sport and tutor new consumers, as component of founding new sport teams, could be well thought-out. Realizing that the incentives of participants are multidimensional and multifarious does lead managers to how to position fantasy sport, predominantly in attracting new targets.

Our study makes significant contributions to the upward body of technology acceptance research by making obvious that a better understanding of the function of attitude can improve the model's expectedness about consumers' acceptance of IT. We ascertained that, in the setting of technology acceptance, affective as well as cognitive attitudes are two distinct psychological concepts. Since Davis et al.'s [5] finding that attitude offers slight value in elucidating IT use, the attitude has often been neglected in understanding technology acceptance. Some studies even considered consumer beliefs as well as attitudes as if they were interchangeable. Our findings confirm that they are not. This is an essential point to note in the setting of technology acceptance literature, which often considers attitude as an affective concept, paying no heed to its cognitive component [5]. Since internet based fantasy sport is somewhat new phenomenon, future investigation in this context must pay attention to the dissimilarity between the cognitive as well as affective components of attitude in consumers' acceptance of technology. Researchers should carry on probing fantasy sports consumption motivations and behaviors using diverse indicators. Even if this research expelled the PU concept for its extrapolative utility concerns in modeling hedonic technology adoption [12], we propose future research should integrate PU to fully look at its effect on the fantasy sport acceptance process.

Acknowledgements

We thank Sora K. Mahan from University of Northern Colorado, for her assistance in collecting data, Dr. Hatem Ibrahim from IRD-France for his help in conducting statistical analyses for this paper.

Appendix A.

Perceived ease of use (PEU) (Davis, 1993)

- Playing fantasy football leagues online would be easy.
- Learning how to play fantasy football leagues online would be easy.

Technological complexity adapted from (Son et al., 2012)

- I have no difficulty in reading the information displayed on the mobile computing device's screen.
- I have no difficulty in accessing the fantasy football leagues online.
- I have no difficulty in reading the information displayed on fantasy football leagues website.

Affective Attitude (Yang and Yoo, 2004)

Using NFL fantasy football website makes me feel (place X mark on each of the three scales)

- Happy
- Positive
- Good

Cognitive Attitude (Yang and Yoo, 2004)

- Wise
- Beneficial
- Valuable

Fantasy sport website use (Yang and Yoo, 2004)

On the average, I use the fantasy sport website (pick most accurate answer)

- infrequent
- (1) about once a week, (2) 2 or 3 times a week, (3) 4 or 6 times a week, (4) about once a day, (5) more than once a day

References:

- [1] C. M. Leporini, Fantasy sports bring real opportunities, American Marketing Association-Marketing Matters Newsletter. Retrieved 24 (2006). February.
- [2] J. Drayer, S.L. Shapiro, B. Dwyer, A.L. Morse, J. White, The effects of fantasy football participation on NFL consumption: A qualitative analysis. *Sport Man. Rev.* 13 (2010) 129–141.
- [3] L.K. Farquhar, R. Meeds, Types of fantasy sports users and their motivations. *J. Comput-Mediat Comm.* 12(4) (2007) 1208-1228.
- [4] F. D. Davis, Perceived usefulness, perceived ease of use and user acceptance. *MIS Quart.* 23(1989) 145-158.
- [5] F.D. Davis, R.P. Bagozzi, P.R. Warshaw, User acceptance of computer technology: a comparison of two theoretical models. *Manag. Sci.* 35(1989) 982–1003.
- [6] H.M. Weiss, R. Cropanzano, Affective events theory: a theoretical discussion of the structure, causes and consequences of affective experiences at work, in: B.M. Staw, L.L. Cummings(Eds.), *Research in Organizational Behavior*, JAI Press, Greenwich, CT, 1996, pp. 1 – 74.
- [7] H.C. Triandis, Value, attitudes, and interpersonal behavior, *Nebraska Symposium on Motivation*, University of Nebraska Press, Lincoln, NE, 1980.
- [8] D. Goodhue, I/S attitudes: toward theoretical and definitional clarity, *Database* 19 (1988) 6 – 15.
- [9] E.B. Swanson, Measuring user attitudes in MIS research: a review, *OMEGA-Int. J. Manage. S.* 10 (1982) 2.
- [10] M. Fishbein, I. Ajzen, *Belief, attitude, intention and behaviour: an introduction to theory and research*. Reading, MA: Addison-Wesley, 1975
- [11] N.W. Davis, M.C. Duncan, Sport knowledge is power: reinforcing masculine privilege through fantasy sports league participation, *J. Sport Soc. Issues*, 30(2006) 244-264.
- [12] Okazaki, S., Skapa, R. & Grande, I. (2008) Capturing global youth: mobile gaming in the U.S., Spain and the Czech Republic. *J. Comput-Mediat. Comm.* 13(4) 827-855.
- [13] I. Ha, Y. Yoon, M. Choi, Determinants of adoption of mobile game under mobile broadband wireless access environment. *Inform. Manage.* 44 (2007) 276-286.
- [14] R.L. Thompson, C.A. Higgins, J.M. Howell, Personal computing: toward a conceptual model of utilization, *MIS Quart.* 15 (1991) 125–143.
- [15] Al-gahtani, Modeling the electronic transactions acceptance using an extended technology acceptance model, *Appl. Comp. Info.* 9 (2011), 47–77.
- [16] W. Cheung, W. Huang, Proposing a framework to assess internet usage in university education: an empirical investigation from a student's perspective, *Brit. J. Educ. Technol.* 36 (2005) 237–253.
- [17] H. Van der Heijden, User Acceptance of Hedonic Information Systems, *MIS Quart.* 28 (2004).
- [18] E. Karahanna, D. Straub, N.L. Chervany, Information technology adoption across time: a cross-sectional comparison of pre-adoption and post-adoption beliefs, *MIS Quart.* 23 (1999) 2.
- [19] W.J. McGuire, Attitudes and attitude change, in: G. Lindzey, E. Aronson (Eds.), *Handbook of Social Psychology*, Chapter 19, Random House, New York, 1985, pp. 233 – 346.
- [20] R.P. Bagozzi, R.E. Burnkrant, Attitude organization and the attitude – behavior relationship: a reply to Dillon and Kumar, *J. Pers. Soc.*

Psychol. 49 (1985) 1.

[21] www.fsta.org (2013).

[22] F.D. Davis, User acceptance of information technology: system characteristics, user perceptions and behavioral impacts, *Int. J. Man. Mach. Stud.* 38 (1993) 3.

[23] H. Son, Y. Park, C. Kim, J-S. Chou, Toward an understanding of construction professionals' acceptance of mobile computing devices in South Korea: An extension of the technology acceptance model, *Automat. Constr.* 28 (2012) 82–90.

[24] H-D. Yang, Y. Yoo, It's all about attitude: revisiting the technology acceptance model, *Decis. Support. Syst.* 38 (2004) 19 – 31.

[25] A.S. Goldberger, Structural equation models: an overview, in: A.S. Goldberger, O.D. Duncan (Eds.), *Structural Equation Models in the Social Science*, Chapter 1, Seminar Press, New York, 1973, pp. 1 – 18.

[26] L.A. Hayduk, *Structural Equation Modeling with LISREL: Essentials and Advances*, Johns Hopkins Univ. Press, Baltimore, MD, 1987.