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### Recommended Citation

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# Exploring the Impact of IT Mindfulness on E-government Affordances: An Exploratory Study

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## ABSTRACT

Technological advancements have enhanced the delivery of goods and services in both the public and private sectors. The continued diffusion of diverse Internet-based innovations has increased the need for more research on citizen use and perceptions of technology services. In this study, we explore the role of IT mindfulness and extended use of technology on citizen use of e-government related systems' affordances. To test the proposed model, we administered a survey to 108 U.S. citizens. The results indicate both IT mindfulness and extended use have a significant, positive impact on e-government systems' related affordances. Implications for research and practice are discussed.

## Keywords

E-government systems' affordances, Affordance Theory, IT mindfulness, extended use, patterns of use, Technology Adoption.

## INTRODUCTION

E-government initiatives are growing in popularity among citizens across the globe. According to the United Nations E-government survey, "in 2014 for the first time, all 193 United Nations Member States now have national Web sites, but the majority remain at the low or intermediate levels of e-government development, termed emerging and enhanced stages in the United Nations four stage online service model" (United Nations, 2014, p.5). As technology continues to evolve, so does the promise of information communication technology (ICT) utilization in the public sector. E-government services enable participatory government, reduce transactional costs and facilitate seamless government-to-constituent interaction. In particular, e-government services make it more convenient for citizens to complete transactions with public agencies.

ICTs are empowering governments to facilitate e-participation. E-participation is defined as: "the process of engaging citizens through ICTs in policy and decision-making in order to make public administration particularly, inclusive, collaborative and deliberative for

intrinsic and instrumental ends" (United Nations, 2014, p. 61). Designing and developing e-government related systems that are widely used may facilitate citizens' engagement in other areas, in general, and e-participation, in particular.

Our broader aim in this study is to explore how factors such as mindfulness (Langer and Moldoveanu, 2000), patterns of use (Burton-Jones & Grange, 2013), extended use (Liang et al., 2015; Hsieh & Wang, 2007), innovative use, routine use, perceived ease of use, and technical self-efficacy (Li, et al., 2013) influence affordances provided by e-government types of systems. Given that this is an exploratory study and we wish to test our model, in this article we have focused on IT mindfulness and extended use. We have also limited our study to one type of e-government application – online tax return system and have limited our study only in the U.S. This study can be extended to other e-government applications and other countries.

Mindfulness use, effective use, patterns of IT use, and affordance theory, in particular, related to improving productivity and increasing efficiency and effectiveness have been sporadically studied over the past 15 years. The majority of the empirical studies in these areas have been related to a few disciplines. For example, in psychology (Langer and Moldoveanu, 2000; Baer, 2003; Bishop et al., 2004); in Management Information Systems (Swanson and Remiller, 2004; Fichman, 2004; Thomas, 2006; Wong, et al., 2009; Teo, et al., 2011; and in Management and Organizational Science (Thomas, 2006; Weick and Sutcliffe; 2006).

To the best of our knowledge, Mindfulness use, effective use, patterns of use, and affordance theory have not been studied in areas like Human-Computer Interaction. Nor have they been specifically related to e-government services such as systems designed for state or federal electronic filing of income tax returns. As stated in the United Nations, 2014 report "to increase the chance of success for their e-participation strategy, governments can benefit from those platforms and channels that are being used by citizens rather than creating new ones. Through e-participation, ICTs can help governments become better

listeners and more agile partners in sustainable development efforts” (p. 74).

It is critical that we look at how users interact with various types of application software and identify ways to move from simple usage to effective usage of these kinds of systems (Anwear et al. 2016; Bataineh & Abu-Shanab 2016). We need to design systems for e-government services that users are able to use mindfully. Designers need to be cognizant of patterns of use of users of these systems. A major aspect of this stream of research falls under the broad area of Human – Computer Interaction.

## BACKGROUND LITERATURE

### E-government

As we stated in the previous section, e-government applications are growing in terms of development and use all over the world. Newer technologies are used to develop e-participation types of systems and support interaction between citizens and governmental agencies. Models for e-government adoption have also been developed over the last few years (Meijer, 2015). Al-Dalou and Abu-Shanab (2013) identified ‘two of the most key dimensions of e-participation: the levels of participation and tools and technologies of participation’ (p. 5). We suggest that there is a third significant dimension and that is how citizens use and interact with e-participation and e-government types of applications. Our aim in this stream of research is to identify various factors that have positive effect on e-government related systems.

### Mindfulness Use

The term “mindfulness” is essentially a psychological term and it has been described somewhat similarly by researchers in various disciplines. Sun and Fang (2010) advocate that mindfulness is an indication of an individual’s state of alertness. Butler and Gray (2006) imply that mindfulness impacts how we collect information, how we process and perceive that information, and how that experience affects our actions. Langer and Moldoveanu (2000) suggests that mindfulness displays the mental state of an individual. They propose that mindfulness is a good indication of how individuals interact with their environments. In the case of IT systems use, we extend this description and suggest that mindfulness influences how individuals interact with computerized systems.

### Effective Use

The concept of effective use was raised by Marcolin et al., (2000) more than a decade ago. That article suggested researchers focus their attention from regular use to effective use. We similarly believe users need to pay more attention to effective use rather than regular use of

information systems. Unfortunately, the effective use has not been adequately addressed by either researchers or users. More recently, Burton-Jones and Grange (2013) argued that indeed effective use is “quite complex” and “it is extremely under researched” (Burton-Jones & Grange, 2013, p. 632). They used representation theory (Wand and Weber, 1990, 1995) and presented their own theory behind effective use to promote more research in this area. This model expanded the scope of representation theory to include “users and their goals,” “effective system use,” “task performance,” “context of use,” and “external disturbances” (Burton-Jones and Grange, 2013, p. 638).

Burton-Jones and Grange (2013) define effective use “as using a system in a way that helps attain the goals for using the system” (p. 633). Fishback and Ferguson (2007) state a goal is “a cognitive representation of a desired end point” (p. 491). Burton-Jones and Grange (2013) realized different users may have different goals in using a system. Hence, they developed their effective use theory based on a multi-goals perspective. They propose that effective use must correlate with the elements of use – users, systems, and tasks presented in Burton-Jones and Straub (2006).

Burton-Jones and Grange (2013) argue that although information systems are used for many specific tasks, “the core purpose of *all* such systems is to help people understand the states of some real-world systems that are relevant to them, such as the states of their mind” (p. 636). They conclude that users need to be more “knowledgeable, experienced, motivated, and supported” to be more effective (p. 650). For systems and tasks, they recommend they need to be “simple, flexible, familiar, and independent of other systems/tasks” (p. 650).

### Patterns of Use

In general, Patterns of use is directly related to information systems use. In particular, it is related to perceived usefulness, perceived ease of use, and user acceptance (Davis, 1989; Centefelli and Schwarz, 2011). Technology acceptance and use (Davis, 1989; Venkatesh et al., 2003) are two theoretical models in the area of user acceptance.

Patterns of use have been described by several researchers to include transparent interaction, representational fidelity, informed action (Burton-Jones and Grange, 2013, p. 643), routine use, innovative use (Li, et al., 2013, p. 659), and system exploration (Liang, et al., 2015, p. 326), cognitive absorption (Burton-Jones and Straub, 2006, p. 327) and extended use (Liang, et al., 2015, p. 323 ; Hsieh and Wang, 2007, p. 217).

### Affordances Theory

Affordances theory (Gibson, 1977) has received significant attention in many disciplines including psychology and management information systems since its inception. Goldkuhl (2008) describes it as “an ecological theory of perception” (p. 1). Gibson (1986) suggests using objects and surfaces to describe affordance “if a terrestrial surface is nearly horizontal ... nearly flat... sufficiently extended... and its substance is rigid ... then the surface *affords* support” (p. 127). Burton-Jones and Grange (2013) describe four kinds of affordances – “sensory,” “physical,” “cognitive,” and “functional” (p. 639). In our paper, we specifically consider five affordances for the IRS tax return Web site to potentially offer:

- Affordance 1. Capturing and archiving digital data about tax returns.
- Affordance 2. Accessing and completing tax return forms and schedules anytime from anywhere.
- Affordance 3. Coordinating and exchanging data entry across sites such as between the IRS and State Tax return sites.
- Affordance 4. Creation or facilitation of standardized data and tasks among various sites such as the IRS and State sites.
- Affordance 5. Monitoring organizational operations and performance (audit trail of what was done, by whom, and when).

Mindfulness has attracted a number of studies during the past few years including its impact on innovation using information technology (Swanson and Ramiller, 2004). In their paper, Swanson and Ramiller (2004) argued that although many organizations use IT to innovate, only a few of them truly innovate using IT. In particular, they contrast “mindful innovation” with “mindless innovation” with citing a simple example of ERP implementation (p. 554). A major goal of using information technology mindfully is to use them effectively. Effective use of systems is a function of users, systems, and tasks (Burton-Jones and Straub, 2006). Users have competencies, tasks have characteristics, and systems have affordances and constraints. An example of a system’s affordance is the system’s user interface. The better the user interface the more likely users are able to use it more effectively. One research question we propose in our study is:

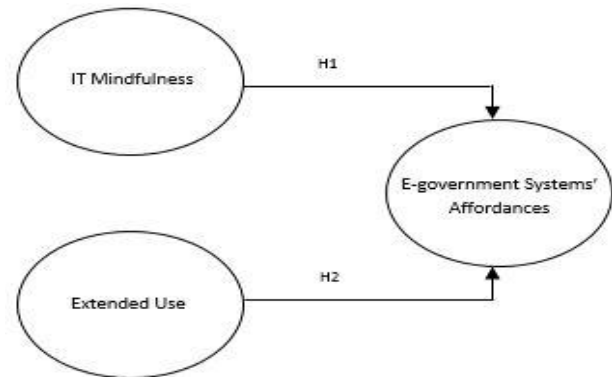
*H1: IT mindfulness has a positive effect on e-government related systems’ affordances.*

Similar to mindfulness use, extended use has received some attention in recent years to increase systems’ utilization in organizations and by individuals to avoid underutilization. Hsieh and Wang (2007) suggests organizations rarely use their information systems to the fullest extent. Hence, they do not receive the maximum returns for their technology investment. We believe this is the case for individual users of e-government related

systems as well. Hsieh and Wang (2007) propose “extended use” concepts and define it as “using more system features to support one’s tasks” (p. 216). Our second research question is:

*H2: Extended use has a positive effect on e-government related systems’ affordances.*

Given the aforementioned literature and hypotheses, we propose the following research model.



**Figure 1. Proposed Research Model**

## METHODOLOGY

To test our proposed research model, we administered an online survey to technology users in the United States to assess their perceptions on online tax filing. We selected online tax filing since many citizens have utilized this service. The respondents consisted of 108 U.S. citizens solicited through a Qualtrics panel. The age of respondents ranged from 18 to more than 75 years old. Sixty percent of the participants were female. Ninety-two percent completed an e-government transaction and seventy-nine percent used the IRS Tax Return Web site to complete their last income tax return.

The items were adapted from existing scales and measured via a Likert-type scale. Multiple questions were used to measure each of the various factors. For example, for Affordance 1, survey respondents had to select a response from 1 (not at all) to 7 (to a great extent) as a response to the following question: How much does the IRS Tax Return Web site facilitate capturing and archiving digital data about your tax return? For measuring extended use, survey respondents had to select from 1 (strongly disagree) to 7 (strongly agree) for the following question: In a typical tax season preparation, I often use most of the features of the IRS Tax Return Web site to support my return completion.

Before testing the model, we conducted a preliminary reliability and validity analysis. All scales were above the .70 Cronbach’s alpha threshold (Cronbach, 1970): E-

government Affordance (.891), Extended Use (.775) and IT Mindfulness (.931). The results of principle components factor analysis indicate all of the items loaded on the appropriate factor and none of the items cross-loaded. The loadings ranged from .455 to .848.

## RESULTS

Our work at this point is an exploratory study and, as such, we have limited the complexity of our model and we are testing the model. We collected a significant amount of data and intend to expand our model to include other user characteristics. For this paper, the hypotheses were tested using multiple linear regression analysis. The model explains forty-seven percent of the variance in e-government related systems' affordances. The adjusted  $R^2 = 0.478$ . Since the overall model was significant ( $F=46.653$ ,  $p < 0.001$ ), we tested the significance of each variable.

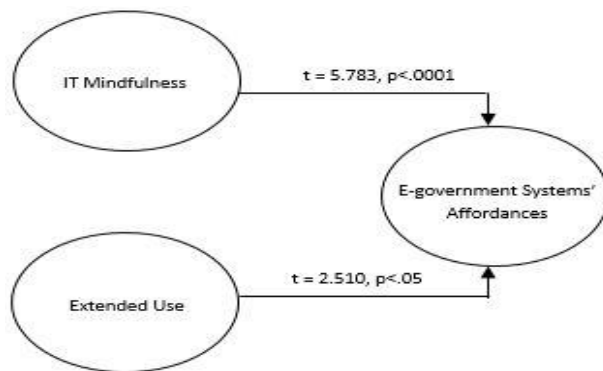


Figure 2. Significant Results

## DISCUSSION

Both of the proposed hypotheses are supported. IT mindfulness has a positive effect on e-government related systems' affordances (H1) and extended use has a positive effect on e-government related systems' affordances (H2). Regarding IT mindfulness, citizens who are inquisitive and inclined to explore diverse features of the tax return Web site, are more likely to have a positive perception of the systems' affordances (i.e. the system's user interface). With regards to extended use, the results indicate citizens who use most of the features of the tax return Web site, including some of the more obscure features, are more likely to have a positive perception of the systems' affordances (i.e. the system's user interface).

### Implications for Research and Practice

The proposed model provides a foundation for future exploration of e-government affordances. In particular, it can be used to explore how citizens use an e-government system and to what extent the system (application) is

efficient and effective. It highlights the emerging importance of IT mindfulness and use or perceptions of e-government services. As government agencies continue to invest human and capital resources into electronic initiatives, it is imperative for both researchers and practitioners to understand the factors that impact citizen's use and perceptions of e-government related systems. This study is an initial step toward an understanding of the interaction between IT mindfulness, extended use of technology, and e-government systems affordances.

### Recommendations for Future Research

Future research should replicate and extend the proposed model by exploring diverse technological innovations, e.g. (social media and mobile devices/technology) which are increasingly utilized by public sector organizations. Future research should include the role of IT mindfulness on citizen extended use of social media platforms to engage with the public sector. For instance, how does IT mindfulness impact citizen perceptions and adoption of participatory government initiatives? How will emerging trends, such as the Internet of Things (the Industrial Internet), impact the public sector in general and citizen perceptions of e-government affordances in particular?

## CONCLUSION

In this study, we explore the role of IT mindfulness and extended use of technology on citizen's use and perceptions of e-government related systems' affordances. This study contributes to the existing literature in two important ways. First, we explore two phenomena that have yet to be examined in the e-government domain: IT mindfulness and e-government systems affordances. Second, we propose a model that integrates these two research streams to provide a parsimonious and predictive model. The proposed model accounts for forty-seven percent of the variance in e-government systems affordances. It is a useful platform for future exploration of affordance theory in the digital government domain.

## REFERENCES

1. Al-Dalou, R. & Abu-Shanab, E. (2013). E-participation levels and technologies. In *The 6th International Conference on Information Technology (ICIT 2013)* 1-8.
2. Anwer Awer, M., Esichaikul, V., Rehman, M., & Anjum, M. (2016). E-government services evaluation from citizen satisfaction perspective: A case of Afghanistan. *Transforming Government: People, Process and Policy*, 10(1), 139-167.
3. Baer, R. A. (2003). Mindfulness training as a clinical intervention: a conceptual and empirical review. *Clinical Psychology: Science and Practice*, 10(2), 125-143.

4. Bataineh, L., & Abu-Shanab, E. (2016). How Perceptions of E-participation Levels Influence the Intention to Use E-government Websites. *Transforming Government: People, Process and Policy*, 10(2).
5. Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., Segal, Z. V., Abbey, S., Speca, M., Veling, D., & Devin, G. (2004). Mindfulness: a proposed operational definition. *Clinical Psychology: Science and Practice*, 11(3), 230-241.
6. Burton-Jones, A., & Grange, C. (2013). From use to effective use: a representation theory perspective. *Information Systems Research*, 24(3), 632-658.
7. Burton-Jones, A., & Straub, D. (2006). Reconceptualizing system usage. *Information Systems Research*, 17(1), 38-60.
8. Butler, B. S., & Gray, P. H. (2006). Reliability, mindfulness, and Information Systems. *MIS Quarterly*, 30(2), 211-224.
9. Centefelli, R. T., & Schwarz, A. (2011). Identifying and testing the inhibitors of technology usage intentions. *Information Systems Research*, 22(4), 808-823.
10. Cronbach, L. J. (1970). *Essentials of psychological testing*. New York: Harper & Row.
11. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
12. Fishback, A., & Ferguson, M. F. (2007). The goal construct in social psychology. In Kruglanski, A. W. & Higgins T. E., eds. *Social Psychology: Handbook of Basic Principles*. Guilford, NY, 490-515.
13. Fichman, R. G. (2004). Going beyond the dominant paradigm for information technology innovation research: emerging concepts and methods. *Journal of the Association for Information Systems*, 5(8), 314-355.
14. Gibson, J. J., (1977). The theory of affordances. In shaw, R. E. & Bransford, J., eds. *Perceiving, Acting, and Knowing*. Erlbaum, Hillsdale, NJ, 67-82.
15. Gibson, J. J., (1986). *The Ecological Approach to Visual Perception*, Hillsdale, NJ: Lawrence Erlbaum Associates.
16. Goldkuhl, G. (2008). Actability theory meets affordance theory: clarifying HCI in IT usage situations. *ECIS 2008 Proceedings*. Paper 242. Available from <http://aisel.aisnet.org/ecis2008/242>.
17. Hsieh, J. J. Po-An, & Wang, W. (2007). Explaining employees extended use of complex information systems. *European Journal of Information Systems*, 16, 216-227.
18. Langer, E. J., & Moldoveanu, M. (2000). The construct of mindfulness. *Journal of Social Issues*, 56(1), 1-9.
19. Li, X., Hsieh, J. J. Po-An, & Rai, A. (2013). Motivational differences across post-acceptance information systems usage behavior: an investigation in the business intelligence systems context. *Information Systems Research*, 24(3), 659-682.
20. Liang, H., Peng, Z., Xue, Y., Guo, X. & Wang, N. (2015). Employees' exploration of complex systems: an integrative view. *Journal of Management Information Systems*, 32(1), 322-357.
21. Marcolin, B. L., Compeau, D., Munro, M. C., & Huff S. L. (2000). Assessing user competence: conceptualization and measurement. *Information Systems Research*, 11(1), 37-60.
22. Meijer, A., (2015). E-government innovation: Barriers and strategies. *Government Information Quarterly*, 32(2), 198-206.
23. Sun, H., & Fang, Y. (2010). Towards a model of mindfulness in technology acceptance, *ICIS 2010 Proceedings*. Paper 121, [http://aisel.aisnet.org/icis2010\\_submissions/121](http://aisel.aisnet.org/icis2010_submissions/121)
24. Swanson, E. B., & Ramiller, N. C. (2004). Innovating mindfully with information technology. *MIS Quarterly*, 28(4), 553-583.
25. Teo, T. S. H., Srivastava, S. C., Ranganathan, C., & Leo, J. W. K. (2011). A framework for stakeholder oriented mindfulness: case of RFID implementation at YCH group, Singapore. *European Journal of Information Systems*, 20(2), 201-220.
26. Thomas, D. C. (2006). Domain and development of cultural intelligence. *Group and Organization Management*, 31(1), 78-99.
27. United Nations (2014). Department of Economic. *United Nations E-government Survey 2014: E-Government for the Future We Want*. United Nations Publications. ISBN 978-92-1-123198-4.
28. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis F. D. (2003). User acceptance of information technology: towards a unified view. *MIS Quarterly*, 27(3), 425-478.
29. Wand, Y. & Weber, R. (1990). An ontological model of an information system. *IEEE Transactions on Software engineering*, 16(11), 1282-1292.
30. Wand, Y. & Weber, R. (1995). On the deep structure of information systems. *Information Systems Journal*, 5(3), 203-223.
31. Weick, K. E. & Sutcliffe, K. M. (2006). Mindfulness and the quality of organizational attention. *Organization Science*, 17(4), 514-524.
32. Wong, C. W. Y., Lai, K. H., & Teo, T. S. H. (2009). Institutional pressures and mindful IT management: the case of a container terminal in China. *Information and Management*, (46), 434-441.