

---

# Developing a Model to Explain Adoption of Social Media for Knowledge Sharing by Construction Professionals

---

Ramtin Etemadi, [r.etemadi@qut.edu.au](mailto:r.etemadi@qut.edu.au)  
*Queensland University of Technology, Australia*

Karen Manley, [k.manley@qut.edu.au](mailto:k.manley@qut.edu.au)  
*Queensland University of Technology, Australia*

Carol Hon, [carol.hon@qut.edu.au](mailto:carol.hon@qut.edu.au)  
*Queensland University of Technology, Australia*

## Abstract

Social media use has a positive impact on work-related knowledge sharing (KS). This encourages professionals to use social media for KS and learning purposes. Nevertheless, the extent, nature and patterns of this use have been little explored to date in the construction industry, due to lack of a comprehensive model. After reviewing previously developed models and KS literature, this study proposes a new model which addresses this gap. The proposed model is an extension of the Unified Theory of Acceptance and Use of Technology (UTAUT) model. Four new constructs have been added to the original model to extend its explanatory power in the current context: (1) learning, (2) hedonic motivation, (3) self-efficacy and (4) trust.

**Keywords:** Social media, knowledge sharing (KS), knowledge management (KM), technology adoption models, UTAUT, construction professionals.

## 1 Introduction

Effective and efficient management of knowledge is frequently cited as needed to improve financial (e.g. profit margins) and non-financial (e.g. competitiveness of the firm) performances (Carrillo 2004; Claycomb, Dröge and Germain 2002; Hasan and Al-Hawari 2003; Zaim, Tatoglu and Zaim 2007; López, Peón and Ordás 2009). Thus there is significant interest in tools that can engender successful KM processes. The construction industry has significant problems in managing knowledge between fragmented projects and partners due to KS barriers.

Facilitation of KS, as one of the main elements of knowledge management (KM), can enhance the process of KM (Zaim, Tatoglu and Zaim 2007; King 2009; Riege 2005; Wang and Noe 2010), and subsequently improve firm performance and the wider industry (Chua and Lam 2005a). This improvement is impeded by scarcity of successful KS activities (Alavi and Leidner 2001; Davenport and Prusak 1998; Huber 1991; Wasko and Faraj 2005; Chua and Lam 2005b).

Due to its fragmented nature, much construction knowledge essentially resides in the minds' of professionals who are working within the industry. This can be highlighted as one of the major differences between the construction industry and other industries in terms of adoption of knowledge sharing tools. Construction professionals leave for new projects after gaining the knowledge in a project, carrying away the gained knowledge. Therefore, unlike many other industries, the work-related knowledge cannot be captured at the organisational level (Rezgui 2001). This puts the construction industry in particular need of KS activities based on individuals' interactions and beyond the conventional KS activities at the organisational level. Social media is a solution for this particular need. Social media can be used as a facilitating tool for KS activities at the individual level. It is easy to use, cost-effective, readily available, and a self-directed communication tool (Dave and Koskela 2009). Therefore it has a positive impact on professional KS and KM (McGowan et al. 2012; Peregrin 2011; Chan et al. 2013).

This highlights the value of designing a research program that can answer questions regarding the patterns of social media use for KS among construction professionals. It also highlights the importance of identification of determinants of users' attitudes toward the use of social media for KS among construction professionals.

## **2 Research problem and aim**

There is no single existing model that is capable of capturing all socio-technical aspects of social media use for professional KS in the construction industry. The basic theories of technology adoption, such as Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), and Technology Acceptance Model (TAM) can only offer a general understanding of adoption of social media for KS by professionals. Also, previously extended versions of these theories do not cover the particular case of 'social media use by construction professionals'. There is a need for development of a model that captures various socio-technical aspects of this particular case. This paper aims to address this knowledge gap.

## **3 Methodology**

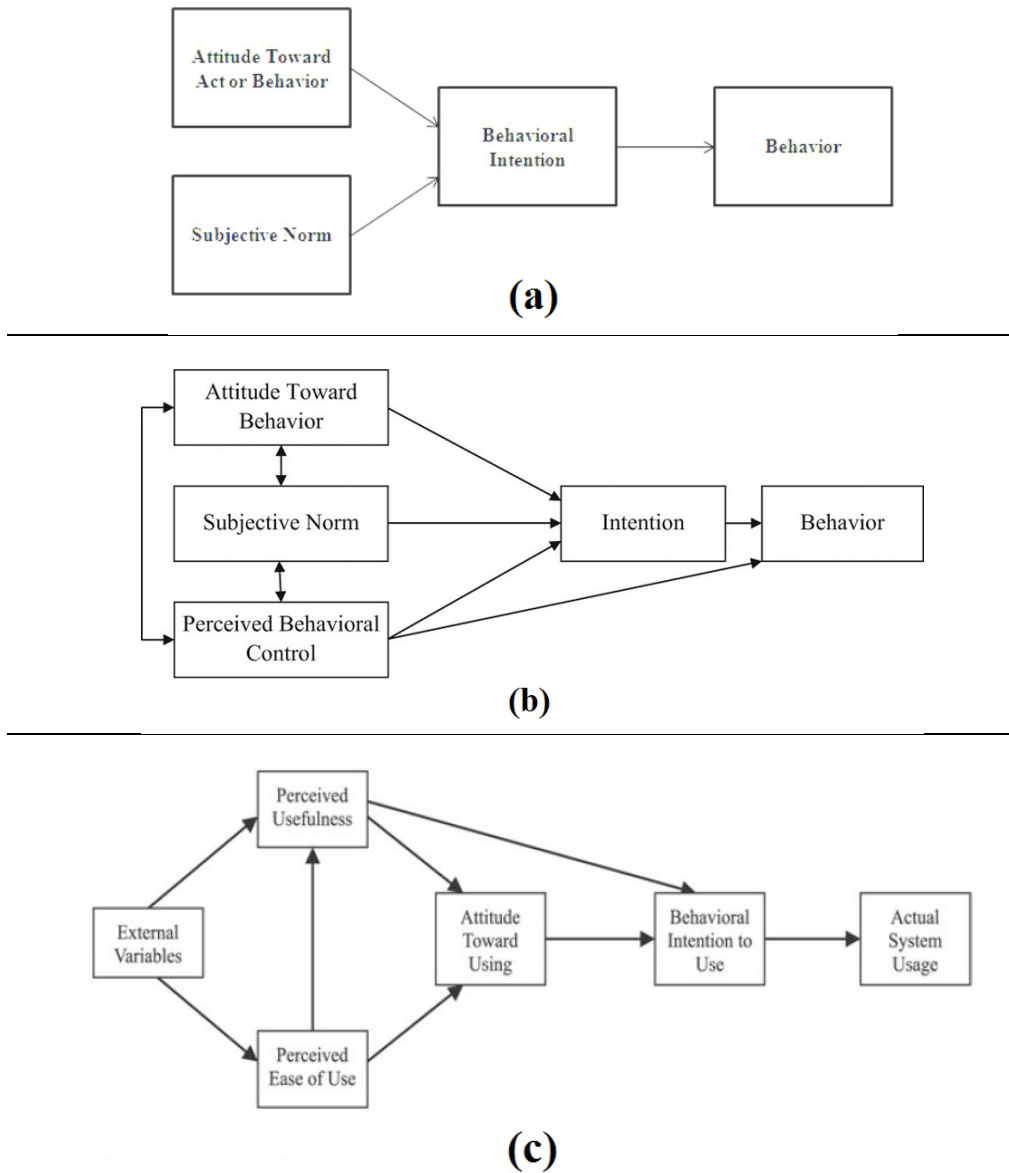
The study consists of two major stages of literature review that results in the development of a new model. In the first stage, general technology adoption models were reviewed to find the best model for the investigation of social media for work-related KS. The second stage of review aimed at capturing the particular influences that are not included in the previously developed extensions of the existing model. To address the knowledge gap, the review of the existing models was followed by extracting new constructs from social media, KM and KS literature.

## **4 Major technology adoption models**

In the 1980s researchers started developing and testing various models to explain and investigate use of new technologies. From a social psychology perspective, Ajzen and Fishbein (1980) presented the TRA, a simple model which was a preliminary step to satisfy scholars' thirst for a powerful technology adoption model (Figure 1-a). TPB (Figure 1-b), presented by Ajzen (1985), was an extension to TRA. TPB aimed at addressing some major limitations of TRA such as low percentages of explained variance and lack of accuracy. Despite providing a better explanatory power in comparison with TRA, TPB was not substantially successful.

In addition to TPB, Deci and Ryan (1985) developed Motivational Model (MM), which had a similar purpose. MM emerged at almost the same time. After more than three decades, there are scarce studies that have employed MM. This decreases its validity for application in novel contexts such as the information systems and social media.

TAM (Figure 1-c) which was proposed by Davis (1989) added an Information Systems' (IS) perspective to TRA. TAM was simple and applicable. But it was not satisfactory in terms of its explanatory power. TAM was later revised to be gain more explanatory power and become more comprehensive by Venkatesh et al. (2003). This revision resulted in the Unified Theory of Acceptance and Use of Technology (UTAUT) (Figure 2).



**Figure 1:** (a): TRA; (b): TPB; (c): TAM.

Venkatesh et al. (2003) developed UTAUT to understand and describe adoption of Information Technology (IT) at the individual level. UTAUT is based on an empirical comparison of major previously developed technology adoption models, including TAM. UTAUT gathers together the key features of these models (Table 1). The fact that UTAUT has many variables in comparison with other adoption models gives it better explanatory power.

With an higher explanatory power, UTAUT has also been applied to research in other contexts including learning (Wang, Wu and Wang 2009), KS (He and Wei 2009), online KS (Li 2010) and the construction industry (Samuelson and Björk 2013) which have common characteristics with the subject of this study.

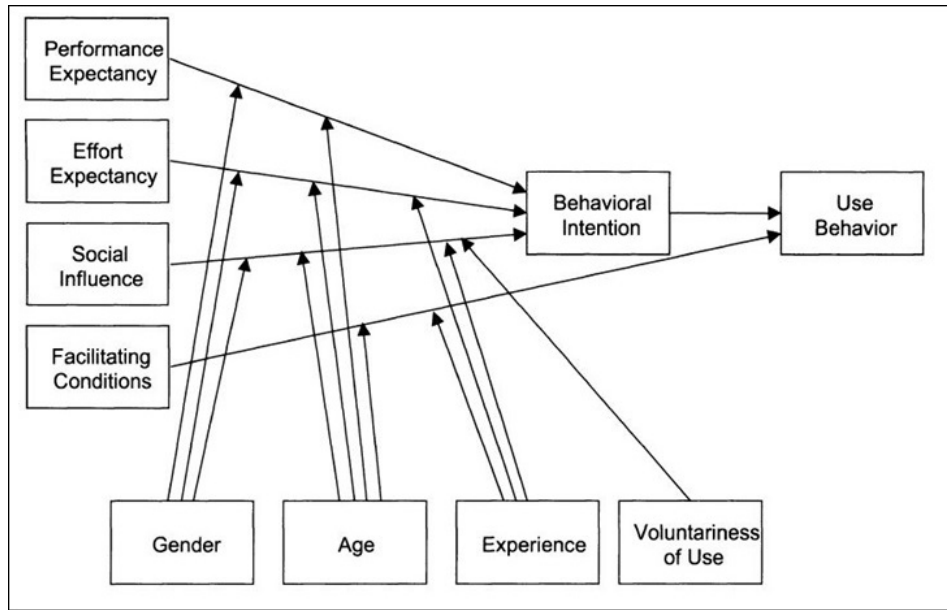


Figure 2: UTAUT (Adopted from Venkatesh et al. (2003).

Table 3: UTAUT Variables with related Constructs and models based on Venkatesh et al. (2003 and Williams (2009.

UTAUT Variable	Construct	Model
<b>Performance Expectancy (PE)</b>	Perceived Usefulness	C-TAM-TPB / TAM
	Extrinsic Motivation	MM
	Job Fit	MPCU
	Relative advantage	IDT
	Outcome Expectations	SCT
<b>Effort Expectancy (EE)</b>	Perceived Ease of Use	TAM
	Complexity	MPCU
	Ease of Use	IDT
<b>Social Influence (SI)</b>	Social Influence	TRA
	Subjective Norm	TPB / DTPB / C-TAM-TPB
	Social Factors	MPCU
	Image	IDT
<b>Facilitating Conditions (FC)</b>	Perceived Behavioural Control	TPB / DTPB / C-TAM-TPB
	Facilitating Conditions	MPCU
	Compatibility	IDT

## 5 UTAUT and its extensions

### 5.1 UTAUT as the base model

Among different models that can be employed for the explanation of social media adoption for work-related KS among construction professionals, TAM and UTAUT excel in terms of ease of applicability, previous applications and their explanatory power. However, UTAUT considers individual differences more than TAM. It also has a more comprehensive approach and higher explanatory power compared with TAM. In comparison with the preceding models, UTAUT is relatively new. Nevertheless, due to its confirmed validity and viability, it has gained widespread acceptance. These factors provide a strong rationale for choosing UTAUT as the base for our model.

UTAUT has four main variables predicting users' technology acceptance:

1. Performance expectancy (PE):
  - The degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh et al. 2003).
2. Effort expectancy (EE):
  - The degree of ease associated with the use of the system (Venkatesh et al. 2003).
3. Social influence (SI):
  - The degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh et al. 2003).
4. Facilitating conditions (FC):
  - The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. While the other three variables are thought to impact behaviour via intentions, this factor is thought to have a direct impact on behaviour.

In this paper we add specific novel extensions suited to the particular case of social media for professional KS.

## **5.2 Extending UTAUT**

Previously extended versions of UTAUT do not cover all aspects of social media use. Among them, Wang, Wu and Wang (2009) study into the acceptance of mobile-learning is one of the rare studies that has proposed an extension of UTAUT to investigate a phenomenon that shares many characteristics with the subject of this study.

Wang, Wu, et al. (2009) defined mobile learning as the delivery of learning to students beyond time and location limitations, using wireless internet and mobile devices like smart phones. In this regard mobile learning links the contexts of ICT adoption and KS. Wang, Wu and Wang (2009) proposed 'self-management of learning' (Smith et al., 2003) and 'perceived playfulness' as extensions to the original UTAUT. The results of their study indicated that the effect of self-management of learning on intention of adoption was significant.

Self-management of learning has roots in educational research and is defined as the learners' ability to manage the process of learning. It is an outcome of a holistic approach to different elements in self-development, self-directed learning and action learning. The importance of self-management of learning in learning achievements has been noted in literature from a number of different perspectives, including online learning, resource-based learning, distance education, and flexible learning (Zimmerman et al., 1986).

Wang, Wu and Wang (2009) also demonstrated that perceived playfulness has a significant impact on the behavioural intention of the users (Wang, et al., 2009). Perceived playfulness in the model proposed by Wang, Wu and Wang (2009) corresponds to hedonic motivation in the other extensions of UTAUT (e.g. UTAUT2 (Venkatesh, Thong and Xu 2012)). "Hedonic motivation is defined as the fun or pleasure derived from using a technology" (Venkatesh, Thong and Xu 2012). Hedonic motivation plays an important role in determining technology adoption (Brown and Venkatesh 2005).

Hedonic impulse is one of the common reasons for adoption of social media too (Sledgianowski and Kulviwat 2009). Thus the two extension variables, 'self-management of learning' and 'hedonic motivation' proved useful.

## **5.3 New extensions for KS on social media**

### **5.3.1 Knowledge sharing self-efficacy**

Social media is centred upon the communications and interactions of users who generate knowledge. This enables them to learn from and contribute to that knowledge (Lee et al., 2003). If users doubt their capability to successfully perform KS activities it is unlikely that they participate in the process (Hsu, et al., 2007). This introduces the concept of KS self-efficacy (KSSE) in online community. KSSE is

defined as user’s self-evaluation about her capability to deal with the challenges in exchanging knowledge among users on virtual platforms (Hsu, et al., 2007). Many researchers have investigated the impact of KS self-efficacy on KS behaviour concluding that KSSE has a positive impact on online KS behaviour (Hsu et al. 2007; Kankanhalli, Tan and Wei 2005; Bock and Young-Gul 2002). This construct should be addressed as a potential significant impact factor that is not included in previously developed models in addition to the factors mentioned before.

**5.3.2 Trust**

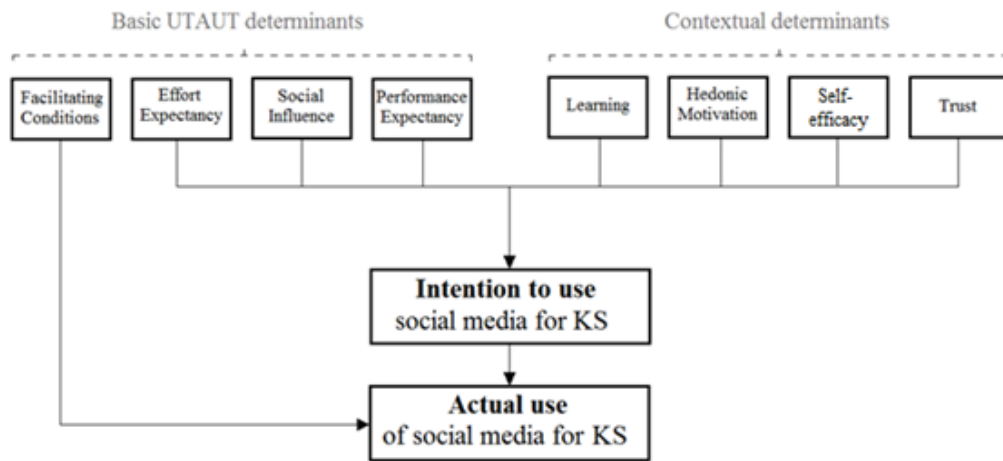
Further review of the literature of KS suggests the importance of trust among individuals. Trust is an important factor in driving technology adoption (Levin 2003). The common and simple definition of trust is an individual’s willingness to be vulnerable (Levin 2003). Previous studies demonstrated that trust can have a positive impact on KM processes in general and KS in particular (Holste and Fields 2010; McGowan et al. 2012; Michailova and Sidorova 2011; Paul and McDaniel Jr 2004; Levin 2003).

Interpersonal trust is the particular type of trust that is addressed in the context of online KS. Interpersonal trust is the main characteristic of relationships that can have a strong impact on knowledge creation and sharing networks (Levin 2003). Levin (2003 and Paul and McDaniel Jr (2004 identified competence and relational (benevolence) as the main types of interpersonal trust in online networks. Competence trust is whether the other party is capable of doing what they say they will do. Relational trust refers to “the extent one feels a personal attachment to the other party and wants to do good by the other party, regardless of egocentric profit motives” (Paul and McDaniel Jr 2004).

Competence trust can be captured by performance expectancy in the original UTAUT, as this construct addresses a similar concept of user’s perceived work-related gains from participation in the KS activities. But the relational trust is not incorporated in UTAUT, and this new theoretical consideration is proposed in this paper.

Relational trust can impact willingness to share knowledge on social media with peers. Therefore, adding relational trust to the variables of UTAUT enriches the model with another important determinant of social media for KS. To simplify the proposed model, we will use the term ‘trust’ instead of ‘relational trust’ in this study.

Extending UTAUT with the constructs discussed above results in a new model which is shown in the following figure (Figure 3):



**Figure 3:** Proposed model for adoption of social media for KS by construction professionals.

**6 Conclusion**

There is no single existing technology adoption model that is capable of capturing all aspects of adoption of social media for work-related KS in the construction industry. This paper starts with UTAUT, and adds specific novel extensions suited to its particular context. Learning, hedonic motivation, KS self-efficacy and trust are the proposed extension variables. The theoretical contribution of this paper is addressing the need for a model that covers various socio-technical aspects of adoption of social media for work-related KS that can be used in the context of the construction industry. As a future work, the model will be tested empirically to get validated. This empirical study is in progress.

The implications of the validated model in the construction industry will help knowledge management experts to utilise social media for knowledge sharing in a more effective way.

## 7 References

- Ajzen, Icek. 1985. "From intentions to actions: A theory of planned behavior." In *Action control*, 11-39: Springer.
- Ajzen, Icek and Martin Fishbein. 1980. "Understanding attitudes and predicting social behaviour."
- Alavi, Maryam and Dorothy E Leidner. 2001. "Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues." *MIS quarterly*: 107-136.
- Bock, G.W and Kim Young-Gul. 2002. "Breaking the Myths of Rewards: An Exploratory Study of Attitudes about Knowledge Sharing." *Information Resources Management Journal (IRMJ)* 15 (2): 14-21.
- Brown, Susan A and Viswanath Venkatesh. 2005. "Model of adoption of technology in households: A baseline model test and extension incorporating household life cycle." *MIS quarterly*: 399-426.
- Carrillo, Patricia. 2004. "Managing knowledge: lessons from the oil and gas sector." *Construction Management and Economics* 22 (6): 631-642.
- Chan, Randolph Chun Ho, Samuel Kai Wah Chu, Celina Wing Yi Lee, Bob Kim To Chan and Chun Kit Leung. 2013. "Knowledge management using social media: A comparative study between blogs and Facebook." *Proceedings of the American Society for Information Science and Technology* 50 (1): 1-9. doi: 10.1002/meet.14505001069.
- Chua, Alton and Wing Lam. 2005a. "Why KM projects fail: a multi-case analysis." *Journal of knowledge management* 9 (3): 6-17.
- Chua, Alton and Wing Lam. 2005b. "Why KM projects fail: a multi - case analysis." *Journal of Knowledge Management* 9 (3): 6-17.
- Claycomb, Cindy, Cornelia Dröge and Richard Germain. 2002. "Applied product quality knowledge and performance: Moderating effects of uncertainty." *International Journal of Quality & Reliability Management* 19 (6): 649-671.
- Dave, Bhargav and Lauri Koskela. 2009. "Collaborative knowledge management—A construction case study." *Automation in Construction* 18 (7): 894-902.
- Davenport, Thomas H and Laurence Prusak. 1998. *Working knowledge: How organizations manage what they know*: Harvard Business Press.
- Davis, Fred D. 1989. "Perceived usefulness, perceived ease of use, and user acceptance of information technology." *MIS quarterly*: 319-340.
- Deci, Edward L and Richard M Ryan. 1985. *Intrinsic motivation and self-determination in human behavior*: Springer Science & Business Media.
- Hasan, Helen and Maen Al-Hawari. 2003. "Management styles and performance: a knowledge space framework." *Journal of knowledge management* 7 (4): 15-28.
- He, Wei and Kwok-Kee Wei. 2009. "What drives continued knowledge sharing? An investigation of knowledge-contribution and-seeking beliefs." *Decision Support Systems* 46 (4): 826-838.
- Holste, J. Scott and Dail Fields. 2010. "Trust and tacit knowledge sharing and use." *Journal of Knowledge Management* 14 (1): 128-140.
- Hsu, Meng-Hsiang, Teresa L Ju, Chia-Hui Yen and Chun-Ming Chang. 2007. "Knowledge sharing behavior in virtual communities: The relationship between trust, self-efficacy, and outcome expectations." *International journal of human-computer studies* 65 (2): 153-169.
- Huber, George P. 1991. "Organizational learning: The contributing processes and the literatures." *Organization science* 2 (1): 88-115.
- Kankanhalli, Atreyi, Bernard CY Tan and Kwok-Kee Wei. 2005. "Contributing knowledge to electronic knowledge repositories: an empirical investigation." *MIS quarterly*: 113-143.
- King, William R. 2009. *Knowledge management and organizational learning*: Springer.
- Levin, Daniel Z. 2003. "Nurturing Interpersonal Trust in Knowledge-Sharing Networks." *The Academy of Management Executive (1993-2005)* 17 (4): 64-77.
- Li, Wei. 2010. "Virtual knowledge sharing in a cross-cultural context." *Journal of Knowledge Management* 14 (1): 38-50.
- López, Susana Pérez, José Manuel Montes Peón and Camilo José Vázquez Ordás. 2009. "Information technology as an enabler of knowledge management: an empirical analysis." In *Knowledge Management and Organizational Learning*, 111-129: Springer.
- McGowan, Brian S, Molly Wasko, Bryan Steven Vartabedian, Robert S Miller, Desirae D Freiherr and Maziar Abdolrasulnia. 2012. "Understanding the Factors That Influence the Adoption and Meaningful Use of Social Media by Physicians to Share Medical Information." *Journal of medical internet research* 14 (5): e117.

- Michailova, Snejjina and Elena Sidorova. 2011. "From group-based work to organisational learning: the role of communication forms and knowledge sharing." *Knowledge Management Research & Practice* 9 (1): 73-83.
- Paul, David L and Reuben R McDaniel Jr. 2004. "A field study of the effect of interpersonal trust on virtual collaborative relationship performance." *Mis Quarterly*: 183-227.
- Peregrin, Tony. 2011. "Time to tweet: social networking for surgeons." *Bulletin of the American College of Surgeons* 96 (2): 46.
- Rezgui, Yacine. 2001. "Review of information and the state of the art of knowledge management practices in the construction industry." *The Knowledge Engineering Review* 16 (03): 241-254.
- Riege, Andreas. 2005. "Three-dozen knowledge-sharing barriers managers must consider." *Journal of knowledge management* 9 (3): 18-35.
- Samuelson, Olle and Bo-Christer Björk. 2013. "Adoption processes for EDM, EDI and BIM technologies in the construction industry." *Journal of Civil Engineering and Management* 19 (sup1): S172-S187.
- Sledgianowski, Deb and Songpol Kulviwat. 2009. "Using social network sites: The effects of playfulness, critical mass and trust in a hedonic context." *Journal of Computer Information Systems* 49 (4): 74-83.
- Venkatesh, Viswanath, Michael G Morris, Gordon B Davis and Fred D Davis. 2003. "User acceptance of information technology: Toward a unified view." *MIS quarterly*: 425-478.
- Venkatesh, Viswanath, James YL Thong and Xin Xu. 2012. "Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology." *MIS quarterly* 36 (1): 157-178.
- Wang, Sheng and Raymond A. Noe. 2010. "Knowledge sharing: A review and directions for future research." *Human Resource Management Review* 20 (2): 115-131.
- Wang, Yi - Shun, Ming - Cheng Wu and Hsiu - Yuan Wang. 2009. "Investigating the determinants and age and gender differences in the acceptance of mobile learning." *British Journal of Educational Technology* 40 (1): 92-118.
- Wasko, Molly McLure and Samer Faraj. 2005. "Why should I share? Examining social capital and knowledge contribution in electronic networks of practice." *MIS quarterly*: 35-57.
- Williams, Paul W. 2009. "Assessing Mobile Learning effectiveness and acceptance, The George Washington University.
- Zaim, Halil, Ekrem Tatoglu and Selim Zaim. 2007. "Performance of knowledge management practices: a causal analysis." *Journal of knowledge management* 11 (6): 54-67.