# An Extension of the Technology Acceptance Model in Mobile -BIM

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## Abstract

One result of the rapid spread of smart devices and their real-time information exchange capabilities has been the launch of various mobile-based project management information systems (PMIS). Such PMISs have been developed and used in the Building Information Modeling (BIM) field for checking models and sharing cloud-based information. Within the construction industry, many such tools are improving work efficiency. There are still, however, many negative attitudes on the use of such technology in Korea. This study therefore presents the key factors for the acceptance of mobile-BIM PMIS technology. To achieve this, we present external variables and technology acceptance models based on a literature review. It especially focuses on acceptance of mobile-BIM PMIS in the design phase.

**Keywords –**
Mobile-based, BIM, Technology Acceptance Model(TAM), Design Phase

## 1 Introduction

Various mobile-based project management information systems (PMIS) have been developed to take advantage of real-time information exchange. Mobile PMIS, used in the field by the construction industry include a real-time safety management system, a mobile-based process management system and a mobile-based shared drawing system.

Such programs provide easy access to needed information that can be monitored and exchanged in real time, and lead to increased efficiency. In some sites, safety has more than tripled through the use of mobile PMIS, and paperwork and drawing management have been reduced, resulting in significant cost savings.

In the Building Information Modeling (BIM) field, various mobile PMIS are developed and used for checking the model and for sharing cloud-based information. Since 2011, many companies, including Autodesk, Graphisoft, and Tekla, have rolled out systems which reduce costs and rework rates at overseas sites (Hong et al., 2019). These function in both mobile and PC environments. There are still, however, many negative attitudes on the use of technology in Korea, especially in the design phase.

This study suggests ways to promote acceptance of mobile-BIM PMIS technology. To this end, we present key external variables and technology acceptance models based on a literature review.

## 2 The Technology Acceptance Model (TAM) of Mobile-BIM PMIS

### 2.1 Mobile-BIM Project Management Information System (PMIS)

A Mobile-BIM PMIS is a mobile-based system that provides an environment in which BIM information can be utilized. The technical characteristics of Mobile-BIM PMIS can be divided into BIM and mobile PMIS which can perform tasks and manage related information effectively. Mobile-BIM PMIS benefit organizations as well as individuals

### 2.2 The External Variable of Mobile-BIM PMIS

Mobile-BIM PMIS used for the benefit of the organization include the TAM2 (Venkatesh et al., 2000), and IS success model (DeLone et al., 2003). Literature reviews analyze the external variables of these systems.

The original TAM (David, 1989) promotes the inclusion of social influencing variables because it validates an individual's hypothesis formed on the basis of an external variable. To improve this, Venkatesh & Davis (2000) extended the model to TAM 2 (or ETAM) also based on social influencing variables. The external variables in TAM 2 include subjective norms, image, self-efficacy, and personal innovativeness.

The IS success mode of DeLone & McLean (2003) divided the information system into six areas and presented a model of the relationship between these areas. External variables include System Quality, Information Quality and Service Quality.

Table 1 The External Variable of Mobile-BIM TAM

| External Variable | | Reference |
|---|---|---|
| Related Organization | Subjective Norm<br>Image | [1], [6], [10] |
| Related Personnell | Self Efficacy<br>Personal Innovativeness | [6],[8], [10] |
| Related Quality | System Quality<br>Information Quality<br>Service Quality | [1], [5], [6], [7], [8], [9], [10] |
| Cost | | [1], [7], [8], [9] |
| Experience | | [10] |

Accordingly, the external variables of Mobile-BIM PMIS are "Variable Related Organization," "Variable Related Personnel," "Variable Related Quality," "Experience," "Cost" (see Table 1). The model is shown as Figure 1.
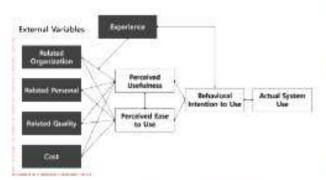


Figure 1. Put figure caption here

## 3    Conclusion

Mobile-BIM PMIS generates benefits in the form of more productive work performance and real-time communication in the field. This study therefore suggests external variables compiled into models that affect the acceptance of Mobile-BIM PMIS. External variables derived from the existing literature review are "Variable Related Organization," "Variable Related Personnel," "Variable Related Quality," "Experience" and "Cost." Each variable is expected to play a part in promoting acceptance Mobile-BIM PMIS. Further studies would require a questionnaire regarding the variables presented so as to verify the relationship between variables based on hypotheses. This study is fundamentally meaningful for the acceptance of Mobile-BIM PMIS.

## Acknowledge

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