A Study on the Effects of Empowerment and Habit on Continuance Usage of Pervasive Business Intelligence Systems

Y.M. Han  
Department of Information Management,  
National Central University, Taiwan (R.O.C.)  
954403017@cc.ncu.edu.tw

C.K. Farn  
Department of Information Management,  
National Central University, Taiwan (R.O.C.)  
ckfarm@mgt.ncu.edu.tw

Abstract

Pervasive business intelligence system (BIS) have been adopted by organizations to provide internal and external information to stakeholders in decision-making scenarios. However, the continuance usage of pervasive BIS becomes a challenge from a practical standpoint. The aim of this study is to extend a model that explains the pervasive BIS continuance usage. In addition to Limayem et al.'s model which considers habit construct, we also include the influence of empowerment on individual authorization and intrinsic task motivation in the pervasive BIS context. The model was empirically tested using data from 117 respondents to shed light on the situation of voluntary continuance usage. Our results support the extended IS model and conclude that habit has a direct effect on pervasive BIS continuance usage. We also find psychological empowerment is influenced by structural empowerment and acts as a pure moderator between pervasive BIS continuance intention and continuance usage behavior.

1. Introduction

Following the huge data flow that characterizes information generation, managers and aides have to make competitive decisions in an uncertain environment. The Business Intelligence System (BIS) is one of the key developments that have led to improved user decision making and has thus become a major concern for organizations. According to the 2012 annual report from Gartner, the focus in the analysis of large amounts of data will increasingly be on providing prediction, optimization and more decision flexibility at the time [1]. Organizations strive to utilize BIS to obtain a competitive advantage [2, 3]. The system is designed to provide internal and external information for the requirements of the decision maker.

When appropriately designed, the BIS can enhance the decision-making of top-managers and even pervade the actions of middle-managers and front-line personnel [4]. Following by BI functionality more pervasively available to all levels, people can use pervasive BIS to incorporate their goals and communicate throughout the organization on their own initiative. Every employee can be empowered to adopt pervasive BIS tools, to find an efficient way to make decisions and to monitor what they are controlling. After pervasive BIS dissemination, individual contributors can have greater impact on the organization’s strategic and operational decision-making capabilities.

Prior studies on BIS have focused on understanding its successful adoption to ensure quality, satisfaction, and usage [3, 5, 6]. Other studies have focused on decision-making performance, such as the consequences of BIS use [2], and decision-making transparency [3]. Therefore, the usage of BIS is able to create a competitive advantage for their organization [7]. But, it depends on whether the stakeholders are willing to continue to use it. When there is greater internal BIS usage across departments and roles, it is expressed in greater pervasiveness of BI technology and process adoption [8]. In the past, understanding the successful adoption of information technology has primarily been based on the theories of TRA (theory of reasoned action), TPB (theory of planned behavior), TAM (technology acceptance model), and so forth. All of these are focused on the initial acceptance (or not) of a particular IS [9]. This study also assumes that the “long-term viability of an IS and its eventual success depend on its continued use rather than first-time use [10].” We thus look at how to promote pervasive BIS continuance usage.

Bhattercheree studied continuance usage at the individual employee level [10]. He developed an IS continuance model that seeks to determine the IS user’s intention of continuance usage based on expectation-confirmation theory. Limayem et al. later developed a model that extends the IS continuance behavior to include the unconscious perspective. They found that habit-driven behavior also needs to be considered in the model and further integrated the habit...
construct into the theoretical IS continuance model [9]. This paper extends Limayem et al.’s model. It begins with a concern for empowerment which determines intrinsic motivation and influences behavior [11, 12]. Therefore, we assume that users obtain empowerment from successful task assessment which has an impact on pervasive BIS continuance usage.

2. Literature review

2.1. Pervasive BIS

Historically, the BIS (Business Intelligence System) is designed to provide internal and external information to top-managers to facilitate decision-making scenarios. Over time, organizations are making BIS functionality more pervasively available to all stakeholders [8]. This new wave of BIS technology and process adoption evolves from traditional BI and can be described using a variety of labels, such as pervasive BIS, ambient BI, democratization of BI and operational BI [8]. In our study, we adopt the Pervasive BIS to express this new wave of BIS which empowers stakeholders to analyze their own reports and make their own decisions in nearly real-time [13]. In particular, pervasive BIS allows the individual to have a greater impact on organizational objectives as they make the thousands upon thousands of small decisions that characterize their daily work lives [14].

Pervasive BIS can give every employee the power to enhance their KPI. Companies can obtain a competitive advantage by helping transform every front-line employee within an organization so that they are able to make the right decision at the right time [13]. However, pervasive BIS is also an organizational challenge that must be overcome in order to influence employees to continue to use it. This also becomes important from a practical standpoint “in a computing environment that is increasingly driven by voluntary users” [2]. Therefore, in this study we follow and modify the continuance usage model as it relates to appropriate utilization of pervasive BIS.

2.2. Limayem et al.’s IS continuance model

In recent years, there has been an increase in interest in the individual continuing use of information systems in a variety of literature, such as IS continuance, and post-adoptive IT usage [15]. The basic understanding of what leads to continuance usage is fundamentally based upon Bhattacheree’s theory which is based on expectation-confirmation theory. He developed an IS continuance model which allowed one to know the IS user’s intention for continuance usage that is driven by the conscious decision to act [10]. However, although the IS continuance usage literature discusses rational decision on action control, the relationship between stimulus and action is not fully developed [9, 16]. Conceptual advances indicate that we may need to be aware of some habitual factor related to IS continuance usage.

Continuing IS usage is a mixture of the conscious and unconscious. Limayem et al. suggest that habit plays a role in the IS continuance model. The concept of habit has been found to play a role in other disciplines [9], for instance, in health science [17, 18], food consumption [19, 20], and consumer behavior [21, 22]. It is found that personal habit influences IS continuance without conscious intention [9] and also have an interactive effect on changing the value between intention and IS usage behavior [9, 23].

In our study, we focus on the continuance usage of pervasive BIS, since it enhances employees’ analysis efficiency and experience in decision-making. Individuals can get information from predefined reports, interact with OLAP, and use advanced tools, such as data mining and statistics. But, continuance usage of pervasive BIS is influenced by personal conscious and unconscious perspectives. At the conscious side, employees use pervasive BIS continuously because they satisfy and confirm at post-adoption. At the unconscious side, their continuous usage can be attributed to habitual behavior. So, understanding on how common the usage of pervasive BIS is a similar argument to the Limayem et al.’s model. We can assume that continuance use of pervasive BIS is influenced by a mixture of conscious and unconscious concepts which include perceived usefulness, satisfaction, confirmation, continuance intention, continuance usage and habit.

2.3. Empowerment

Empowerment comes from the word “empower” which means to give power. In recent years, employee empowerment to give meaningful content to their work has been a major factor for success in today’s business organizations [24, 25]. Management has a growing interest in the practice of empowering subordinates which has become the principal component of managerial and organizational effectiveness [12, 26]. In early studies, empowerment was often related to delegation or authorization in the organization [11]. We can see empowerment as consisting of a combination of structure, practices, and motivation [12, 27]. In order to distinguish empowerment between different theoretical lenses, we follow Kuokkanen and Leino-Kilpi to separate empowerment into three approaches [28, 29]. The first approach is based on
critical social theory. It emphasizes that people utilize self-reflection and have a basic need to act independently, commonly described by the concepts of oppressed groups. The second approach, called structural empowerment, arises from organization and management theories where the concern is with the organizational structure and the delegation of power and autonomy. The final approach, called psychological empowerment, grows from social psychological theory, and is based on the individual viewpoint, arguing empowerment gives more motivation and results in greater effectiveness. The second and third approaches are used as part of our research model. The first approach does not treat company employees as an oppressed group, so it was not a part of our research that we discussed.

2.3.1. Structural empowerment. Past studies on empowerment mostly focused on those practices which empower employees at work, such as in nursing management [30-32]. However, fundamentally, Kanter argues that employees generally feel that in an empowering environment the organization gives them legal power, authorization and delegation, in which case their attitudes and behaviors encourage greater effectiveness. This type of environment is shaped by the social structure within the organization rather than by the predisposition of the personality or the experience of socialization of the individual [33]. There is an important theoretical concept related to structural empowerment built into Kanter’s “Theory of Structural Power in Organization” [34]. According to Kanter, structural empowerment is related to the individual’s formal and informal power in their position. Furthermore, both forms of empowerment require the mobilization of information, support, resources, and opportunities. Empowered employees are able to fulfill their tasks and improve the quality of their work to achieve organization goals.

2.3.2. Psychological empowerment. Psychological empowerment is an intrinsic motivational construct wherein an employee holds the perception that they have the ability to accomplish their job well, rather than being based on managerial practices regarding the delegation of responsibility [12, 27]. Tomas and Velthouse argue that psychological empowerment is multifaceted and cannot be captured by a single concept [11]. They classify psychological empowerment as having four dimensions which reflect individual intrinsic task motivation: meaning, competence, self-determination (which is synonymous with Thomas and Velthouse’s choice), and impact. The first dimension is meaning, and refers to the value of the task goal or purpose, as judged by the individual’s intrinsic caring about a given task. The second dimension is competence, referring to the level of task the individual is able to perform skillfully. The third dimension is self-determination, referring to the individual’s perception of autonomy in their working environment. The fourth dimension is impact, referring to the level of difference made by the utilization of their ideas by the organization. Based on these four dimensions, Spreitzer and Quinn [35] proposed the PES (Psychological Empowerment Scale) to statistically reflect why people feel empowered.

3. Hypothesis development and research model

3.1. Prior models

In order to examine pervasive BIS continuation usage behavior, this study adopts the original IS continuance model from Bhattacheriee that examined the IS user’s intention to continue using an IS.[10]. This argument holds in the pervasive BIS context of continuance usage base on a post-acceptance model. So, we assume that intention has to be taken into consideration for continued pervasive BIS usage by the employee. Beyond that, the employee’s continuance usage intentions are also influenced by satisfaction and perceived usefulness after using pervasive BIS in an initial adoption phase. This argument is similar to expectation-confirmation theory where individual confirmation has an impact on perceived usefulness and satisfaction. Furthermore, we know that perceived usefulness typically influences user satisfaction post-adoption [9].

Although the IS continuance model tends to emphasize the conscious behavior, the researcher should be aware that there is another side—the unconscious. That is, people habit may influence continuing use of IS [9]. In IS literature, habit has already been used to explain some IS behaviors and not be partially unconscious [2, 23, 36]. Limayem et al. found the antecedents of IS habits (frequency, satisfaction, stable context, and comprehensiveness of usage). From this, we know that habit impacts continuation of IS usage and there is an interactive effect between the IS continuance intention and continuance usage [9].

Therefore, according to Limayem et al., continuance usage of an information system is the consequence of habit which results from satisfaction, comprehensive usage, frequent and stable context. The stable context will be in sync with employees’ usage of pervasive BIS in the work setting. In addition, since pervasive BIS continuance context may influenced by an occasionally specific intention, this study does not
consider the frequency of prior behavior as the antecedent of habit.

In addition, the habits of employees obtained from the past behavior will directly affect future behavior, rather than indirectly through behavioral intention [37]. As a result, we hypothesize that the habits of the pervasive BIS user will affect continuance usage directly. Moreover, as noted in Limayem et al.’s model, habit acts as a suppressor variable to diminish the conscious intention with user continuance behavior [9]. This leads to the hypothesis that habit acts as a moderator in this research context.

3.2. Incorporation of empowerment and pervasive BIS

In the abovementioned paragraph, we discussed previous studies to introduce the context of pervasive BIS continuance usage. It is helpful to know how IS usage is influenced by conscious and unconscious personal factors. However, in the work setting, the employee’s pervasive BIS usage will be impacted by other intrinsic task motivations. That is not the same information system practical situation in organizationally-bound between the individual using online services on personal purpose.

Intrinsic task motivation was mentioned by Conger and Kanungo [12] in relation to psychological empowerment. In past studies, psychological empowerment is positively related to task performance behavior [38-41] and empowerment can moderate the effects of various work environment on behavioral outcomes [38, 40]. On the other hand, psychological empowerment is a consequence of structural empowerment. Such influences form the basis of psychological empowerment [25, 30].

Therefore, when an organization adopts pervasive BIS into the employee’s decision-making process, there is a huge amount of information generated, and employees start to be empowered and make numerous decisions based on pervasive BIS to deliver timely integrated information in multiple operational business units. But, before continuance use of pervasive BIS, a task event provides data to employees about the consequences of ongoing assignment. The data look upon as shape the personal assessments of the task in terms of meaning, competence, self-determination, and impact. This means that the employee has obtained psychological empowerment in their working cue, and then they are willing to continuously use pervasive BIS to enhance their decision-making process in organizations. Psychological empowerment thus is an intervening variable between structural empowerment and continuance usage of pervasive BIS.

Psychological empowerment is an intrinsic motivation where an individual has a sense to accomplish their job well and reflecting a personal’s orientation to their work role [27, 32]. Once psychological empowerment has been engendering, attention is activated by individual motivation. Hence, the pervasive BIS continuance intention influences pervasive BIS continuance usage, and users also need to “feel able” to achieve their job. Thus we propose that psychological empowerment be treated as a construct moderating continuance intention and continuance usage of pervasive BIS. In other words, when an employee holds the pervasive BIS continuance usage intention, they actually continue its usage. However, they also need to have the continued usage intention to impact continuance usage. This depends on the level of psychological empowerment which enhances intrinsic task motivation.

Incorporating the relationship described in the abovementioned paragraphs, we extend Limayem et al.’s IS continuance model in combination with empowerment as shown in Figure 1.

4. Research method

4.1. Measurement

The validation measures for our constructs are based on existing scales from the literature review. Basically, we adopted the instrument from Bhattacheree’s theory to measure perceived usefulness, confirmation, satisfaction, pervasive BIS continuance intention, and pervasive BIS continuance usage [10]. Habit is adopted from Limayem et al. [9] and items measuring comprehensive usage of BIS tools were drawn from consensus of three BIS consultants through the Delphi Technique. Finally, empowerment is divided into two parts. Psychological empowerment was measured by the Psychological Empowerment Instrument (PEI) (second-order latent variable) [27], and structural empowerment was measured using the global construct from the Conditions for Work Effectiveness Questionnaire II (CWEQ-II) [30]. All the measures were rated on a five-point Likert scale ranging from strongly disagree to strongly agree (5). The items used for each scale are given in Appendix.
4.2. Data collection

We invited students from the In-service Masters Program majoring in Information Management (using a snowballing technique) to help us recruit participants from their coworkers. In the longitudinal approach, data collection was divided into two rounds. In the first round, we assessed the volunteer’s perceived usefulness, confirmation, satisfaction, habits, comprehensiveness usage, pervasive BIS continuance intention, structural empowerment, and psychological empowerment. Furthermore, to make sure that respondents are appropriated sample, we asked respondents to answer which function or tools they used in their working environment in the comprehensive usage construct. If none of the tools were chosen, they answered no further questions on the questionnaire. In the following week, the second round measured the respondent’s continued pervasive BIS usage. After these two rounds were completed, it was found that there was a total of respondents 166 respondents in the first round and a total of 117 respondents finished both rounds of data collection. The demographic profiles of respondents are given in Table 1.

5. Data analysis

5.1. Analysis method

Data analysis was performed by the partial least squares (PLS) method, which uses component-based estimation, so does not require multivariate normality of the data and can be used for small to medium sample sizes [42]. For these reasons, SmartPLS was used for data analysis software. Next, we applied two-stage structural equation modeling, as recommended by Anderson and Gerbing [43]. The measurement model was first examined, after which the structural model was examined in the second stage.

5.2. Measurement model

We tested reliability and validity of the measurement model in the research instrument. The indices for this purpose are listed in Appendix. All our reflective measures fulfill the recommend levels of reliability and validity. All item loadings are greater than 0.5 and have significant path loading at the 0.01 level. We follow the criteria suggested by Fornell and
Table 2. Correlation of reflective constructs

<table>
<thead>
<tr>
<th></th>
<th>PU</th>
<th>CF</th>
<th>SAT</th>
<th>INT</th>
<th>USE</th>
<th>HAB</th>
<th>SE</th>
<th>MEA</th>
<th>COM</th>
<th>SDE</th>
<th>IMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td>0.827</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CF</td>
<td>0.676</td>
<td>0.774</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAT</td>
<td>0.625</td>
<td>0.565</td>
<td>0.770</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INT</td>
<td>0.602</td>
<td>0.523</td>
<td>0.523</td>
<td>0.820</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USE</td>
<td>0.279</td>
<td>0.264</td>
<td>0.265</td>
<td>0.201</td>
<td>0.945</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAB</td>
<td>0.545</td>
<td>0.471</td>
<td>0.471</td>
<td>0.638</td>
<td>0.247</td>
<td>0.836</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>0.187</td>
<td>0.296</td>
<td>0.179</td>
<td>0.102</td>
<td>0.055</td>
<td>0.071</td>
<td>0.943</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEA</td>
<td>0.193</td>
<td>0.383</td>
<td>0.284</td>
<td>0.233</td>
<td>0.004</td>
<td>0.245</td>
<td>0.362</td>
<td>0.845</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COM</td>
<td>0.274</td>
<td>0.180</td>
<td>0.231</td>
<td>0.265</td>
<td>0.067</td>
<td>0.218</td>
<td>0.443</td>
<td>0.352</td>
<td>0.895</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SDE</td>
<td>0.184</td>
<td>0.240</td>
<td>0.157</td>
<td>0.135</td>
<td>0.059</td>
<td>0.107</td>
<td>0.719</td>
<td>0.461</td>
<td>0.475</td>
<td>0.867</td>
<td></td>
</tr>
<tr>
<td>IMP</td>
<td>0.082</td>
<td>0.105</td>
<td>0.174</td>
<td>0.080</td>
<td>0.024</td>
<td>0.068</td>
<td>0.515</td>
<td>0.442</td>
<td>0.478</td>
<td>0.510</td>
<td>0.895</td>
</tr>
</tbody>
</table>

NOTE: Diagonal elements are square roots of average variance extracted. PU = perceived usefulness; CF = confirmation; SAT = satisfaction; INT = pervasive BIS continuance intention; USE = pervasive BIS continuance usage; HAB = habit; SE = structural empowerment; MEA = meaning; COM = competence; SDE = self-determination; IMP = impact.

Larcker [44]. The composite reliability (exceeded 0.7) and average variance extracted (exceeded 0.5) met the criteria for convergent validity. The discriminant validity of the instrument was then verified by extracting the squared root of the average variance of each construct, which was higher than the correlation between the construct and other constructs in the model, as shown in Table 2.

Psychological empowerment is modeled by the second-order construct, as shown in Table 3 using the guidelines for specifying hierarchical latent variables provided by Wetzels et al. [45]. We utilize the loading, composite reliability and average variance extracted to assess the reliability and validity. The results show that the AVE does not exceed the cut-off value of 0.50 proposed by Fornell and Larcker [44]. However, the composite reliability and loading are acceptable, therefore convergent validity is established for the psychological empowerment construct.

Table 3. Assessing the second-order construct of psychological empowerment

<table>
<thead>
<tr>
<th>CR</th>
<th>AVE</th>
<th>First-order Contract</th>
<th>Loading</th>
<th>t-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.88</td>
<td>0.39</td>
<td>Meaning</td>
<td>0.768</td>
<td>18.98</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Competence</td>
<td>0.548</td>
<td>8.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Self-determination</td>
<td>0.826</td>
<td>36.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Impact</td>
<td>0.795</td>
<td>22.75</td>
</tr>
</tbody>
</table>

5.3. Structural model

In order to demonstrate the importance of the empowerment construct in our study, we compared the baseline model (Base on Limayem et al.’s model) with our research model to reflect the two-stage data collection. Figure 2 and 3 indicate path coefficients, explanatory power, and associated t-values of these two models.

![Figure 2. Baseline model](Base on Limayem et al.'s model)

![Figure 3. Research model](As are indicated in Figure 3, the path coefficients for pervasive BIS continuance intention were significant. Perceived usefulness had an effect on pervasive BIS continuance intention with a path coefficient of 0.458 and satisfaction had an effect on)
pervasive BIS continuance intention at 0.232. The two constructs accounted for 39.7 percent of the variance. Furthermore, confirmation had an effect on perceived usefulness at 0.676 and on satisfaction at 0.268. They also explained 45.7% and 42.9% of variance, respectively.

However, the antecedent constructs of habit had an effect with a coefficient of 0.463, and the comprehensiveness of usage was not significant. The habit construct had a significance of 0.17 but was not a moderating effect on continuance pervasive BIS usage. On the other structural empowerment had a strongly significant impact on psychological empowerment, with a coefficient of 0.687. Interestingly, psychological empowerment had a positively pure moderating effect on pervasive BIS continuance intention and continuance pervasive BIS usage.

On the interaction effects of psychological empowerment, we also compare the R2 value of the baseline model and research model following a hierarchical process. The difference in R2 of 0.02, 0.15, and 0.35 represent small, medium, and large effect size for interaction [46]. In Table 4, the interaction effect was found to have a large effect size of 0.85. That means psychological empowerment moderates the link between pervasive BIS continuance intention and pervasive BIS continuance usage.

Table 4. Hierarchical test

<table>
<thead>
<tr>
<th>Model</th>
<th>$R^2$</th>
<th>$f^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline model</td>
<td>0.122</td>
<td></td>
</tr>
<tr>
<td>Research model</td>
<td>0.197</td>
<td>0.85</td>
</tr>
</tbody>
</table>

6. Discussion and conclusion

This study extends and tests a model that builds upon the IS continuance and Limayem et al.’s models related to the influence of the habit construct on pervasive BIS continuance usage. Extending the original model, we first examine the role of empowerment in the context of pervasive BIS continuance usage. Specifically, we introduced and find a relationship between the structural empowerment construct and psychological empowerment construct and the existing theoretical links of the model.

6.1. Theoretical implications

Based on Bhattacherjee’s original IS continuance model, our study had a major significance of influence of pervasive BIS continuance intention to pervasive BIS continuance usage. Our data shows intention to no longer be a reliable predictor of behavior, rather the relationship is more complex than previously thought [9, 47-49]. To clarify the relationship affecting the pervasive BIS behavior, we adapt Limayem et al.’s model to include the habit construct as well as extend the model in order to consider environmental cues and intrinsic task motivation that include structural empowerment and psychological empowerment.

Consequently, after analysis of our data, we find that comprehensiveness of usage does not have an effect on habit which means that employee just use a specific pervasive BIS tools in their work setting. This result is inconsistent with Limayem et al.’s model. Although we find that comprehensiveness of usage does not have an effect, there are additional habit antecedents relevant to our study. Specifically, we cannot exclude satisfaction as a habit antecedent relevant to the pervasive BIS usage context.

Furthermore, in our results, habit does not have a moderating effect between pervasive BIS continuance intention and continuance usage. This means that habit will not suppress conscious intention for continuance usage. The reason that habit does not act as a moderator may be because when people use pervasive BIS tools/functions they are consciously thinking about their job and how pervasive BIS fits into this task context. This interferes with habit as a moderator. However, Figure 2 illustrates the habit construct as a determinant of pervasive BIS continuance usage. Habit has the pivotal role as the main driver of continuance usage. Such a direct effect means that habit automatically has a relation beside the conscious decision-making processes [9, 37].

Next, evidence was found for structural empowerment, leading to strong positive psychological empowerment. Specifically, the strong relationship between structural empowerment and psychological empowerment means that social structural factors are important for empowering employees to achieve their work responsibilities [30, 34]. This finding is also consistent with the studies of Laschinger et al., and Knol and Linge [25, 30]. On the other hand, psychological empowerment does not have a direct effect on pervasive BIS continuance usage. However, one very interesting result has been obtained: psychological empowerment has a moderate effect between pervasive BIS continuance intention and pervasive BIS continuance usage. Psychological empowerment is a pure moderator. By definition, a pure moderator variable is a variable that interacts with the predictor variable to modify the form of the relationship, but is not related either to the predictor or the criterion [50]. It is implied that psychological empowerment enhances intrinsic task motivation and modifies the form of the relation between pervasive BIS continuance intention and continuance usage.
6.2. Managerial implications

The findings give some important recommendation to developers, project leaders, and pervasive BIS stakeholders. Especially for nonexecutives, pervasive BIS usage obviously offers much more than traditional BIS usage. In order to facilitate the user to continue we can develop some tools to let the user become familiar with habitual situations. Organizations can give regular training for different work requirements to endorse employee use of pervasive BIS for solving problems.

The results of the present study imply that the organization can stimulate the employee’s psychological empowerment based upon individual work meaning, competence, self-determination and impact. Through managing benefits, employee can become psychologically empowered by the use of pervasive BIS. Therefore, employees have an intrinsic motivation to empower themselves for continuance usage.

6.3. Limitations

However, we should note a few limitations in this study. First, we focus on the pervasive BIS related to enterprise information systems. The results should be carefully handled when generalized to other kinds of information systems. Second, the majority of survey respondents were from Taiwan, so it is also difficult to generalize the results. Finally, our model only explains about 20% of the variance. Because we believe that other factors may affect pervasive BIS continuance usage. For example, different job-levels or BIS tool categories have various contextual factors to influence pervasive BIS continuance usage. So we believe that we can collect details from more respondents to find other significant factors in future research.

7. References

We would like to thank the China Foundation for Promotion of Education and Culture for their support to the presentation of this paper.

8. References


### Appendix. Measures used for constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
<th>Loading</th>
<th>Mean</th>
<th>S.D.</th>
<th>t-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Perceived Usefulness</strong> [10]</td>
<td>PU1=Using the BIS improves my performance in the job.</td>
<td>0.84</td>
<td>3.82</td>
<td>0.651</td>
<td>34.61</td>
</tr>
<tr>
<td></td>
<td>PU2=Using the BIS increases my productivity in the job.</td>
<td>0.79</td>
<td>3.88</td>
<td>0.659</td>
<td>17.20</td>
</tr>
<tr>
<td></td>
<td>PU3=Using the BIS enhances my effectiveness in the job.</td>
<td>0.83</td>
<td>3.87</td>
<td>0.623</td>
<td>28.29</td>
</tr>
<tr>
<td></td>
<td>PU4=Overall, the BIS is useful in the job.</td>
<td>0.85</td>
<td>3.91</td>
<td>0.596</td>
<td>39.67</td>
</tr>
<tr>
<td><strong>Confirmation</strong> [10]</td>
<td>CF1=My experience with using the BIS was better than what I expected.</td>
<td>0.75</td>
<td>3.48</td>
<td>0.624</td>
<td>19.62</td>
</tr>
<tr>
<td></td>
<td>CF2=The service level provided by the BIS was better than what I expected.</td>
<td>0.80</td>
<td>3.36</td>
<td>0.608</td>
<td>22.95</td>
</tr>
<tr>
<td></td>
<td>CF3=Overall, most of my expectations from using the BIS were confirmed.</td>
<td>0.78</td>
<td>3.50</td>
<td>0.773</td>
<td>24.45</td>
</tr>
<tr>
<td><strong>Satisfaction</strong> [51]</td>
<td>SAT1=I am satisfied with the performance of BIS.</td>
<td>0.80</td>
<td>3.76</td>
<td>0.567</td>
<td>22.03</td>
</tr>
<tr>
<td></td>
<td>SAT2=My decision to use BIS was a wise one.</td>
<td>0.76</td>
<td>3.58</td>
<td>0.673</td>
<td>16.75</td>
</tr>
<tr>
<td></td>
<td>SAT3=I am pleased with the experience of using BIS.</td>
<td>0.76</td>
<td>3.89</td>
<td>0.704</td>
<td>21.96</td>
</tr>
<tr>
<td><strong>Pervasive BIS Continued</strong></td>
<td>INT1=I intend to continue using the BIS rather than discontinue its use.</td>
<td>0.89</td>
<td>4.04</td>
<td>0.532</td>
<td>46.79</td>
</tr>
<tr>
<td><strong>Intention</strong> [10]</td>
<td>INT2=My intentions are to continue using the BIS than use any alternative means.</td>
<td>0.85</td>
<td>4.00</td>
<td>0.557</td>
<td>31.65</td>
</tr>
<tr>
<td></td>
<td>INT3=If I could, I would like to continue my use of BIS.</td>
<td>0.71</td>
<td>3.69</td>
<td>0.713</td>
<td>11.54</td>
</tr>
<tr>
<td><strong>Usage</strong> [9, 52]</td>
<td>USE1=In the last 7 days, I am often using the BIS.</td>
<td>0.93</td>
<td>3.21</td>
<td>1.089</td>
<td>78.12</td>
</tr>
<tr>
<td></td>
<td>USE2=In the last 7 days, I spend a long time on every BIS usage.</td>
<td>0.96</td>
<td>2.87</td>
<td>1.022</td>
<td>112.69</td>
</tr>
<tr>
<td><strong>Habit</strong> [9]</td>
<td>HAB1=Using the BIS has become automatic to me.</td>
<td>0.79</td>
<td>3.64</td>
<td>0.737</td>
<td>16.13</td>
</tr>
<tr>
<td></td>
<td>HAB2=Using the BIS is natural to me.</td>
<td>0.86</td>
<td>3.73</td>
<td>0.625</td>
<td>33.86</td>
</tr>
<tr>
<td></td>
<td>HAB3=When faced with a particular task, using the BIS is an obvious choice for me.</td>
<td>0.85</td>
<td>3.65</td>
<td>0.686</td>
<td>28.44</td>
</tr>
<tr>
<td><strong>Comprehensiveness of Usage</strong> [9]</td>
<td>What are your primary uses of the BIS? (multiple-choice)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Structural Empowerment</strong> [30]</td>
<td>SE1=Overall, my current work environment empowers me to accomplish my work in an effective manner.</td>
<td>0.94</td>
<td>3.54</td>
<td>0.737</td>
<td>80.77</td>
</tr>
<tr>
<td></td>
<td>SE2=Overall, I consider my workplace to be an empowering environment.</td>
<td>0.95</td>
<td>3.50</td>
<td>0.805</td>
<td>107.40</td>
</tr>
<tr>
<td><strong>Meaning</strong> [8, CR = 0.88, AVE = 0.72]</td>
<td>MEA1=The work I do is very important to me.</td>
<td>0.75</td>
<td>3.76</td>
<td>0.665</td>
<td>15.83</td>
</tr>
<tr>
<td></td>
<td>MEA2=My job activities are personally meaningful to me.</td>
<td>0.91</td>
<td>3.76</td>
<td>0.715</td>
<td>83.88</td>
</tr>
<tr>
<td></td>
<td>MEA3=The work I do is meaningful to me.</td>
<td>0.88</td>
<td>3.69</td>
<td>0.701</td>
<td>48.21</td>
</tr>
<tr>
<td><strong>Competence</strong> [8, CR = 0.87, AVE = 0.8]</td>
<td>COM1=I am confident about my ability to do my job.</td>
<td>0.91</td>
<td>3.80</td>
<td>0.685</td>
<td>65.40</td>
</tr>
<tr>
<td></td>
<td>COM2=I am self-assured about my capabilities to perform my work activities.</td>
<td>0.93</td>
<td>3.85</td>
<td>0.633</td>
<td>65.97</td>
</tr>
<tr>
<td><strong>Self-determination</strong> [11]</td>
<td>SDE1=I have significant autonomy in determining how I do my job.</td>
<td>0.85</td>
<td>3.88</td>
<td>0.645</td>
<td>27.58</td>
</tr>
<tr>
<td><strong>Psychological Empowerment</strong> [11]</td>
<td>IMP1=My impact on what happens in my department is large.</td>
<td>0.88</td>
<td>3.29</td>
<td>0.799</td>
<td>47.00</td>
</tr>
<tr>
<td></td>
<td>IMP2=I have a great deal of control over what happens in my department.</td>
<td>0.93</td>
<td>3.19</td>
<td>0.870</td>
<td>64.40</td>
</tr>
<tr>
<td></td>
<td>IMP3=I have significant influence over what happens in my department.</td>
<td>0.87</td>
<td>3.08</td>
<td>0.902</td>
<td>48.00</td>
</tr>
</tbody>
</table>

**Note:** α = Reliability (Cronbach’s Alpha), CR = Construct Reliability, AVE = Average Variance Extracted.