Empirical Assessment of an Instrument for Operationalising Factors Affecting Use of B2E Portals

Md Mahbubur Rahim
Monash University, Australia
mahbubur.rahim@infotech.monash.edu.au

Mohammad Quaddus
Curtin University, Australia
Mohammed.Quaddus@gsb.curtin.edu.au

Mohini Singh
RMIT University,
mohini.singh@rmit.edu.au

Abstract

This paper discusses B2E portals, an important e-business model adopted by large organisations to service its employees. To understand the factors affecting the adoption of B2E portals, this paper includes the development of an instrument from literature analysis, application of Information Systems theories, a research model and factors affecting the use of B2E portals by using both qualitative and quantitative methods. Seven important factors affecting the adoption of B2E portals highlighted in this paper include: ease of use; usefulness; compatibility; motivation; helpdesk; organisation support and attitude.

1. Introduction

Business-to-employee (B2E) portals represent an employee centric e-business system, which if successfully implemented, act as a gateway to information and services an organisation has to offer tailored to its employees’ needs and roles [51]. The adoption of B2E portals has a major impact on organisations and their workforce. By providing easy access to relevant information, services, and products, these systems reduce information overload for employees, enhance accessibility of relevant information, and empower employees for making prompt and improved decisions. These benefits in turn help organisations in creating satisfied and productive workforce [18, 31]. B2E portals affect organisational performance through reduced administrative costs [28, 51], streamlined employee related process [46, 47] and enhanced capability to outperform competitors by connecting employees together [22, 37]. Consequently, several industry sources claim an increased growth in the uptake of B2E portals [9, 10, 28]. Yet, despite industry forecasts, the use of B2E portals by employees has largely been ignored in the contemporary scholarly literature. We argue that evaluation of the use of B2E portals by employees represents a key research concern because the benefits (mentioned above) are unlikely to be realised when these portals are not satisfactorily diffused among employees. Therefore, managers need to be aware of the factors that may potentially affect the use of employee portals.

Our analysis of the current e-business literature indicates a clear absence of any rigorous framework to help guide human resources managers address those key factors that need to be taken into consideration for facilitating the usage of B2E portals among employees in organisations. We argue that although a range of factors are identified in the general e-business and wider IT implementation literature streams, their applicability to the context of B2E portals is yet to be examined. The research project reported in this paper was thus initiated with four broad aims: a) to identify the factors that are likely to affect B2E portal use by employees; b) to propose a research model highlighting relationships between factors and portal use, c) to develop an instrument for operationalising the factors included in the proposed model, and d) to evaluate the instrument using established qualitative and statistical approaches. The model and the resulting instrument are useful to IT practitioners because this knowledge would help managers in formulating appropriate guidelines to facilitate effective use of B2E portals in organisations. Likewise, IT researchers can use the model and the instrument as a springboard for undertaking further research to test their applicability in various industry contexts and may recommend areas of additional enhancements.

Our paper is organised as follows. First, a set of core theoretical frameworks are identified from several streams of literature. These frameworks include factors that are reported to have an effect on the usage practices of IT applications. Next, factors expected to affect use of B2E portals by employees are listed. A proposed research model and a set of propositions drawn from the literature are the included with a description of the research approach. An initial theory driven instrument is then developed...
which is later evaluated using well-established qualitative and statistical approaches. Finally, the contributions of the paper are highlighted, and directions for further research are indicated.

2. Literature Analysis

Scholarly literature on B2E portals is limited. Those few studies that are available focus on three specific aspects of B2E portals: factors affecting organisational decisions to introduce B2E portals [38, 39, 42], employee satisfaction with B2E portals [25, 47, 51], and benefits of B2E portals [22, 40, 41]. Little attention (if any) has so far been given to understand the use of B2E portals by employees in organisations that have introduced these applications. As such, we have consulted relevant sources of literature to find out factors that may possibly affect the use of B2E portals by employees. An analysis of the social psychology, innovation and IT implementation streams of literature identifies a total of eight core theoretical frameworks: Technology Acceptance Model (TAM - Davis [15]), Theory of reasoned action (TRA) - Davis et al. [17], Theory of planned behaviour (TPB; Ajzen [5]), Innovation diffusion theory (IDT - Agrawal et al. [4], Moore and Benbasat [32]), Model of PC utilization (MPCU - Thompson et al. [51]), Social cognitive theory (SCT - Compeau & Higgins [14]), Motivational model (MM - Vallerand [53]) and Unified theory of acceptance and use of technology (UTAUT - Venkatesh et al., [53]. These frameworks include a range of key factors that may potentially affect the usage of IT applications by users. Detailed descriptions of these frameworks can be found in the literature and hence are not reproduced in this paper.

An analysis of the frameworks leads to the following observations. First, in most frameworks an assumption is made about the causal relationship between intention and actual behaviour of an individual. It is implicit in the frameworks that the key factors which affect the formation of an individual’s intent to engage in a particular behaviour are equally applicable to that person’s actual execution of that given behaviour. We however argue that in the context of an IT application, actual system usage behaviour has a continuous connotation. Thus, for B2E portal usage, although an individual may have a strong intention to use the portal, there are factors beyond that individual’s control which will govern the actual usage of that portal. For instance, a person may have a very strong intention to use B2E portal, however, due to lack of time or the unavailability of the portal at that given time, the intention may not be materialised into actual usage behaviour. Second, many of the key factors are redundant across the frameworks because they have somewhat overlapping meanings. For instance, factors like perceived usefulness, relative advantage, performance expectancy, outcome expectations, long-term consequences have similar explanations. Third, a total of about 30 key factors are identified in the core frameworks. It is possible to group these factors into technological, user-oriented, organisational and environmental categories. For example, complexity, trialability, compatibility represent the influence of technological characteristics associated with an IT application that may influence its usage by individual users. Likewise, anxiety, attitude, and motivation represent traits of individuals that may affect their usage of IT applications. On the other hand, social factors, facilitating conditions and social influence represent the conditions present in the environment that may affect usage of IT applications by individuals.

In addition to the key factors drawn from the core theoretical frameworks (listed in Table 1), several other factors were discussed in the broader IT implementation literature that were empirically found to have significant association with the users’ usage of IT applications. Typical examples include training level and education level of users [30]. Furthermore, several scholars (e.g. Gefen & Straub [20]; Busch [12]; Morris & Venkatesh [33]; Venkatesh et al. [53]; Burton-Jones & Hubona [11]) report that age and gender are likely to moderate an individuals’ usage of IT applications.

3. Factors Relating to B2E Portal Usage

As our study represents an initial stage of ‘theory building’ exercise, we did not want to develop a comprehensive research model that would include all the key factors identified in the previous section. Moreover, a large research model incorporating all the key factors would be impossible to operationalise in actual field settings due to sheer size of the instrument. Hence, a pragmatic approach was adopted by including a subset of factors identified from the existing theoretical frameworks and the empirical literature.

We have included ‘perceived ease of use’ and ‘perceived usefulness of portals’ because they are the most widely cited and empirically supported factors regardless of the underlying technologies used in building IT applications. We have further chosen compatibility to be a relevant factor because B2E portals contain distinct functionalities and services (e.g. online self-service, collaboration tools, workflow systems) for which compatibility between the
manner in which users’ work in their organisational settings need to be consistent with the way portals operate. We also wanted to find out the influence of psychological perceptions of individuals for wanting to use B2E portals. As such, factors like attitudes towards portal and perceived motivation for portal use were included.

In addition to selecting the above-mentioned five factors from the existing core theoretical frameworks, we also included two important factors (i.e. training level and education level) from the wider empirical literature on IT implementation. These two factors are consistently found to have varying degrees of influence on the usage of various types of IT applications by users. Finally, we wanted to find out if demographic variables such as ‘age’ and ‘gender’ have any moderating effects on the usage of portals by users. Therefore, a total of 9 factors (5 factors from core theoretical frameworks, 2 from the empirical literature sources, and 2 moderating factors) were chosen. We acknowledge that the selection of these factors is somewhat influenced by how we view the acceptance and usage of technology phenomenon in relation to B2E portals and other researchers may differ from your viewpoint.

4. The Research Model and Propositions Development

We now propose a research model that includes 7 independent factors and 2 moderating factors identified in the previous section. The proposed model also includes 2 new independent factors (i.e. help services and organisational support for portal), that we believe are relevant to B2E portal contexts. The justification for inclusion of these new factors is provided later in this section. Together these 11 factors (9 independent and 2 moderating) are likely to influence the use of B2E portals by employees.

To improve clarity of the model, we have classified the independent factors into three broad categories: perceived system characteristics, personal characteristics and organisational support. This classification is consistent with the argument that the environmental setting of B2E portal comprises three distinct entities: organisation, employee and the portal. Thus, factors are associated with each of these entities. We did not include behavioural intention in the model because upon continued use of a B2E portal, habits are formed and thus intention loses its influence on actual behaviour. We now briefly describe how each factor included in this model influence employees’ B2E portal use and then develop a corresponding proposition.

Perceived ease of use: Perceived ease of use refers to the degree of effortlessness in using a system [15]. It is rooted in the argument that a lesser effort (whether mental or physical) required in using an IT application leads to favourable usage from users. For the B2E portal, if the portal is easy to interact with and if information and services are easy to find, the degree of effortlessness thus perceived by an employee will facilitate his/her usage of portal because he/she would find it easier to accomplish tasks using the portal. Our view is consistent with those of Konradt et al. [29] and Nandy and Vaidya [34]. Hence, the following proposition is developed:

\[ P1: \text{Perceived ease of use (PEOU) has a positive influence on employees’ B2E portal usage} \]

Perceived system usefulness: According to the dictionary meaning, a system may be termed useful if it is valuable or productive. This interpretation is consistent with the views expressed by Davis [15] and other leading scholars [e.g. 1, 3] who describe perceived usefulness as an individual’s belief that performing a specific behaviour will lead to favourable outcome. The outcome may involve tangible benefits such as some form of economic gains or work performance improvement and intangible benefits like greater work satisfaction. In the context of the B2E portal, customised services and easy access to relevant information would create a positive perception of employees about the merits of portal. This perception of the portal’s quality would lead to greater use of the portal. When a portal provides relevant information to the employees for them to perform better by accomplishing tasks effectively and efficiently, the portal would be perceived as a tool for gaining work related benefits. As a result, the following proposition is put forward:

\[ P2: \text{Perceived system usefulness (PSU) has a positive influence on B2E portal usage} \]

Compatibility: Employees in general tend to resist changes to their work habits. According to Ram [43], users will not feel encouraged to use an innovative IT system when that system is not compatible with their existing work practice or habits. This view is supported by Bagozzi and Lee [7] who argue that individuals form habits by using an application repeatedly over a long period of time. For the B2E portal context, when a portal is compatible with employees’ work practices, work related values and prior experience in using similar IT-based applications, then they are more likely to continue to use the portal. Thus, the following proposition is developed:

\[ P3: \text{Compatibility (C) of the portal has a positive affect on its usage} \]

Attitude towards portal use: Attitude may be directed towards an object (e.g. a portal) or a
behaviour towards that object (e.g. use of portal) [44]. Attitude towards specific behaviour may be defined as an individual’s positive or negative feelings associated with performing that behaviour. Both TRA [17] and TBP [5] posit that attitude towards usage is mediated by behavioural intention. In light of these theories, we argue that a favourable attitude towards using an IT application will lead to the formation of stronger intentions to use that application. Thus, an individual is more likely to perform a behaviour (e.g. use the system) when his/her intention to perform it is strong enough, provided appropriate environmental conditions are in place. For the B2E portal, an employee’s attitude, developed as a result of belief modification upon continued interaction with the portal, would also affect his/her usage. Therefore, the favourable evaluation of portal use would lead to continued use of the portal. Consequently, the following proposition is developed:

P4: An individual’s positive attitude towards portal use (AU) has a positive influence on portal usage

Perceived motivation: Motivation to perform a specific behaviour can be both intrinsic and extrinsic. Intrinsic motivation refers to performing the behaviour for the mere reason of performing it without any outcome expectations associated with it [51, 53]. On the other hand, extrinsic motivation refers to undertaking an activity because it is instrumental in achieving certain positive outcomes separate from the activity itself. Both intrinsic and extrinsic motivations are known to affect intentions such that a greater motivation would lead to stronger intentions and thus greater usage, but their effect on usage is still completely mediated by intentions [16, 27]. For the B2E portal, we argue that an employee may want to use the portal due to certain underlying motives such as improvement of image and social status at the workplace, compliance with workplace practices and to gain improved job performance. Thus, the following proposition is developed:

P5: Perceived motivation (PM) positively influence portal use

Education level: There is a suggestion in the IT literature (e.g. Mahmood [30]) that individuals with higher level of education are more likely to use a system more because their knowledge and understanding gained through higher qualifications help them explore the use of such IT systems in an innovative way to satisfy their higher order needs. This line of argument is also valid for B2E portals and hence the following proposition is developed:

P6: Higher education level has a positive influence on portal use

Training: Although not mentioned in core theories, training is often considered to be a great facilitator of the use of IT-enabled applications. According to Mahmood et al. [30], training positively affects use of IT applications because it helps improve users understanding on how to use the application to their advantage. Thus, for the B2E portal, when employees think that they were provided with adequate training to use the system without “breaking” it, they would be more confident about using it to their advantage. Thus, the following proposition is developed:

P7: Provision of training positively influences portal usage

Help services: In order to deal with difficulties encountered by employees for using B2E portals, organisations generally provide helpdesk services in the form of individuals or a group to assist their employees. When such groups are not present, it could adversely affect employees’ confidence and morale regarding portal use because of the lack of strategies to resolve issues related to portal usage. Thus, the following propositions is suggested:

P8: Availability of helpdesk services has a positive effect on portal use

Organisational support for portal: Organisations should add new sources of information, both internal and external and provide services and improve features of the portal to meet its employees’ needs. This creates a positive impression on employees with respect to the organisation’s interest is supporting the portal. By creating an evolving portal, organisations can ensure that employees’ information demands are best met. Employee’s perception of degree of support provided by their organisations to the portal would ensure better use of the portal because the organisation attempts to keep up with its employees’ expectations and demands.

P9: The organisation’s interest in supporting the portal will affect portal usage positively

Age: An individual’s perceptions about an IT application and his/her attitudes towards using that application is affected by that individual’s age. There is evidence in the IT literature that older individuals are more likely to use an application based on their perceptions of the degree of effortlessness in using that application [33]. Furthermore, motivation plays a different role based on the individual’s age such that younger individuals would lay more emphasis on using the application based on the positive job related outcome associated with using it [53]. Thus, age moderates the effect of attitude, motivation and perceptions of application characteristics. In the context of the B2E portal, the role of age in
influencing B2E portal usage is based on the fact that older individuals tend to be more rigid in changing their work style because habits and beliefs which they have formed over the years are much stronger among them than for younger individuals. Thus, compatibility of the B2E portal with their past experience and work practices would play a vital role in determining their use of the portal. Moreover, the degree of effort required to use the portal would also be more pronounced for older employees such that if portal use is perceived to involve greater degree of mental effort than their old work practices then the use of the portal would be lower. Job related performance improvement through portal usage motivates younger individuals more due to potential career progression as a result of better performance. Therefore, the following propositions are suggested:

**P10a:** Age will moderate the effect of perceived ease of use on portal usage  
**P10b:** Age will moderate the effect of compatibility on portal usage  
**P10c:** Age will moderate the effect of perceived motivation on portal usage

**Gender:** Existing IT studies indicate that women value an IT system’s perceived usefulness highly which thereby affects the degree of system usage. Women are more likely to use a system than men based on their perception of the system being a useful tool in accomplishing specific tasks [20]. The effect of ease of use on an IT system’s usage too is more pronounced for women than for men because men tend to be more confident with the execution of complex tasks than women [53]. In addition, job related performance outcome was found to be a perceived motivation for men whereas the ease of use was found to affect women’s use of the system. Gender moderates the influence of an individual’s motivation to use an IT system and their perceptions of system characteristics on usage. These findings are also likely to be applicable to B2E context and hence the following propositions are developed:

**P11a:** Gender will moderate the effect of perceived ease of use on portal usage  
**P11b:** Gender will moderate the effect of perceived system usefulness on portal usage  
**P11c:** Gender will moderate the effect of perceived motivation on portal usage

### 5. Research Approach

Drawing upon the suggestions of case study advocates (e.g. Moore and Benbasat [32]; Yin, [56], and Neuman [35]), a rigorous scientific approach was followed in empirically assessing the proposed instrument for operationalising factors affecting use of B2E portals. The approach includes a three stage process. The first stage develops an initial set of 31 items drawn from existing literature which operationanise the factors included in the model. The second stage involves evaluating this initial set of items using a two-phase qualitative approach. In the first phase, a group of participants consisting of 7 users were given a definition of all factors included in the research model and were asked to indicate the degree of importance of each factor on a scale of 1 to 5 where 1 being least important and 5 being most important. Their ratings were aggregated and any factor (and hence its associated items) for which the average rating fell below 3 was removed. The second phase involves a panel of 3 employees (who are actual users of a B2E portal in an academic environment) with different job roles were invited to attend a discussion session with the researchers. During the discussion session, they were given a set of initial items (developed in Stage 1 and retained through the first phase of Stage 2) and a definition of all factors included in the research model. The employees were asked to associate each item with its corresponding factor. Any item that failed to associate with its intended factor was discussed and necessary changes were made to align the item with its intended factor. Any item that did not associate with a factor was removed.

The central idea of evaluating the importance of factors and strengths of association between items and factors involving several groups of people used in the second stage is rooted in the broad notion of card sorting technique [45]. Such a technique helps improve validity of instruments and has been used by other e-commerce researchers [42].

The third stage involved a statistical evaluation of the items using item purification [13] and reliability/validity analysis using Partial Least Square (PLS) based approach [8, 36]. The data required to perform statistical evaluations were collected from a survey in which 161 employees of a large Australian university participated.

### 6. Instrument Generation

For most factors, we have relied on operationalisations reported in the existing literature. However, items were modified to suit the B2E portal context. While modifying the items sufficient care was taken so as not to change its meaning all together. In addition, we have also constructed a set of items for several factors (e.g. training, help services, organisational support for portal and portal usage). A total of 34 items was thus generated and a summary of the operationalisation of the factors
using these items is indicated in Table 1. The last column of this table provides a brief explanation on items included for operationalising each factor. A list of these items is not produced due to page constraints.

<table>
<thead>
<tr>
<th>Factor</th>
<th>No. of Items</th>
<th>Sources</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived ease of use</td>
<td>4</td>
<td>Davis [6], Alshare [6]</td>
<td>Items relating to IS and relevant to B2E context were retained.</td>
</tr>
<tr>
<td>Perceived system usefulness</td>
<td>9</td>
<td>Yang et al. [55] and developed by authors</td>
<td>7 items for service usefulness was created by the authors to address popular services supported by B2E portals (e.g. communication, collaboration, e-commerce purchases and HR related activities) and 2 items for was adapted from Yang et al (2005)</td>
</tr>
<tr>
<td>Compatibility</td>
<td>6</td>
<td>Agarwal and Karhanna [2]</td>
<td>These items measure four components of compatibility: preferred work style, past experience, existing work habits and work related values</td>
</tr>
<tr>
<td>Attitude toward portal use</td>
<td>3</td>
<td>Hartwick and Barki [23]</td>
<td></td>
</tr>
<tr>
<td>Perceived motivation</td>
<td>3</td>
<td>Davis [15]</td>
<td>These items were selected from Davis et al. (1989) to capture economic motive</td>
</tr>
<tr>
<td>Training</td>
<td>2</td>
<td>Developed by the authors</td>
<td>Online training and workshops were included</td>
</tr>
<tr>
<td>Help services</td>
<td>2</td>
<td>Thompson et al. [50] &amp; Developed by the authors</td>
<td>1 item was drawn from Thompson and another was developed by the authors</td>
</tr>
<tr>
<td>Organisational support for portal</td>
<td>3</td>
<td>Developed by the authors</td>
<td>These items focus of regular updates of relevant information, services and collection of feedback regarding portal</td>
</tr>
<tr>
<td>Portal usage</td>
<td>2</td>
<td>Hartwick and Barki [23] and developed by authors</td>
<td>Frequency of usage was adapted from Hartwick and barki (19940 and another item on diversity of use was developed by the authors</td>
</tr>
</tbody>
</table>

7. Empirical Assessment

*Qualitative Assessment:* The seven participants who participated at the first phase of the qualitative assessment stage of the instrument indicated their ratings for the importance of each factor included in the model. Their responses are shown in Table 2. Education level received the lowest score (1.71) in terms of its importance as a determinant of portal usage and was thus removed from the research model. The remaining factors which received a minimum score of 3 were retained.
Table 2: Importance scores for factors

<table>
<thead>
<tr>
<th>Participants</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
<th>F5</th>
<th>F6</th>
<th>F7</th>
<th>F8</th>
<th>F9</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>5</td>
<td>-</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>F</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>G</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Mean rating</td>
<td>4.86</td>
<td>5.00</td>
<td>3.50</td>
<td>4.00</td>
<td>1.71</td>
<td>4.00</td>
<td>3.71</td>
<td>3.71</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Legend: F1 - Perceived ease of use; F2 - Perceived system usefulness; F3 – Compatibility; F4 - Attitude toward B2E portal use; F5 - Education level; F6 - Perceived motivation; F7 – Training; F8 – Help services; F9 - Organisation's interest in supporting portal

The second phase of the qualitative assessment stage entailed establishing the strength of association between the instrument items and the corresponding factors that they measure. Three participants were selected representing a wider variation in their job roles. These participants were asked whether the items, in their current format, reflect the meaning of their corresponding factors. They were also asked to indicate the necessary changes so that the items would better reflect the meaning of their associated factors. Out of 34 only 3 items failed to receive correct association to their corresponding factors by the participants and were thus removed. The remaining 31 items were correctly associated with their intended factors by the participants; however many of them still required further changes. In general, four types of changes were proposed by the participants: (a) addition of missing words, (b) removal of words, (c) replacement of words and (d) restructuring the entire item. The changes suggested by the participants resulted in a 28-item instrument.

**Statistical Assessment:** The 28-item instrument was then subjected to statistical assessment. Two well-known techniques were applied: item purification and reliability/validity test. The data used for the application of these techniques were collected through a pilot survey in which 161 employees randomly participated. Item purification analysis was conducted which identified 4 items having corrected-item-total correlation less than 0.3. These items were removed based on the suggestions of Churchill [13]. Partial Least Square (PLS) technique [8] was then used for comprehensive reliability/validity analysis of the items (now standing at 24) and constructs. These tests involved Individual item reliability, Composite reliability of the constructs, and test of discriminant validity of the constructs.

Item reliability signifies the degree of reliability of the item within a construct. While Barclay et al. [8] suggest that the item loadings should be at least 0.7 for the corresponding to be reliable other authors [21, 26] specify that it could be as low as 0.4. We have chosen a threshold of 0.6 loading for item reliability. After running PLS once we have therefore discarded all items with loadings less than 0.6. These included items 14, 16, 18 and 21 under Usefulness construct and item 27 under Motivation construct. We then ran PLS again with the remaining 19 items. Tables 3 and 4 show the final results of the PLS analysis. It is noted that (see Table 3) loadings of all the 19 items are very high thus signifying that items are now highly reliable for each construct. It is also noted that all loadings are significant at p<0.001.

Composite reliability (also known as Internal Consistency) signifies the degree of internal consistency of the items within a construct. We used the measure developed by Fornell and Larcker [19] which is considered to be superior to the traditional measure of consistency (Cronbach’s alpha), because it is not influenced by the number of indicators. Table 5 shows that all composite reliabilities of the constructs are higher than the acceptable level of 0.7 [8, 26]. For comparison the Cronbach’s alpha measures are also provided in the last column of Table 3. Table 4 also shows a measure called AVE (average variance extracted). It is a measure of variance extracted for each construct by its indicators (items in our case). For a construct to be meaningfully described by its indicators the AVE for the construct should be greater than 0.5 [19]. Table 4 shows that all our constructs pass this AVE test. The
statistical tests confirm that the constructs are reliable.

Table 3: Item loadings of the Constructs

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Item no</th>
<th>Loading*</th>
<th>Composite Reliability</th>
<th>AVE</th>
<th>Cronbach’s α</th>
</tr>
</thead>
<tbody>
<tr>
<td>EaseofUse</td>
<td>10</td>
<td>0.85</td>
<td>0.897</td>
<td>0.744</td>
<td>0.825</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>0.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>0.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usefulness</td>
<td>13</td>
<td>0.69</td>
<td>0.897</td>
<td>0.646</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>0.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>20</td>
<td>0.82</td>
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<td>0.887</td>
<td>0.797</td>
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<td>0.85</td>
<td>0.74</td>
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<td>31</td>
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<tr>
<td>OrgSupp</td>
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<td>0.92</td>
<td>0.916</td>
<td>0.845</td>
<td>0.816</td>
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<td></td>
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<tr>
<td>Attitude</td>
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<td>0.91</td>
<td>0.772</td>
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<td>35B</td>
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<td></td>
<td>35C</td>
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</tr>
</tbody>
</table>

Table 4: Discriminant Validity Test (bold numbers in the main diagonal are the square roots of AVE)

<table>
<thead>
<tr>
<th></th>
<th>EaseofUse</th>
<th>Usefulness</th>
<th>Compatibility</th>
<th>Motivation</th>
<th>HelpDeskServ</th>
<th>OrgSupp</th>
<th>Attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>EaseofUse</td>
<td>0.86</td>
<td></td>
<td></td>
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<tr>
<td>Usefulness</td>
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</tr>
<tr>
<td>Compatibility</td>
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<td>0.633</td>
<td>0.80</td>
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<tr>
<td>Motivation</td>
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<td>0.034</td>
<td>0.024</td>
<td>0.89</td>
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<tr>
<td>HelpDeskServ</td>
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<td>0.221</td>
<td>0.296</td>
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<tr>
<td>OrgSupp</td>
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<td>0.423</td>
<td>0.286</td>
<td>0.161</td>
<td>0.355</td>
<td>0.92</td>
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<tr>
<td>Attitude</td>
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<td>0.693</td>
<td>0.535</td>
<td>0.011</td>
<td>0.337</td>
<td>0.407</td>
<td>0.88</td>
</tr>
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</table>

The final test that we performed using PLS was the discriminant validity test. Barclay et al. [8] describe discriminant validity as the degree to which any given construct is different from any other construct. Discriminant validity is assessed by AVE and comparing it with the inter-construct correlation. Our results show that main diagonal elements are the square roots of AVEs, and off diagonal elements are the inter-construct correlations. For a construct to discriminate other construct its square root of AVE should be higher than corresponding inter-construct correlations down the same column and across the same row. For example, the square root of AVE of Compatibility construct is 0.8 (see Table 4). It is noted that other inter-construct correlations down the Compatibility column and across the Compatibility row are smaller than 0.8. Thus, Compatibility construct discriminates other constructs. Table 4 shows that all our constructs pass the discriminant validity test sufficiently well clearly indicating that one construct is different from the other.

8. Discussion and Conclusion
B2E portals are important, yet an under-researched e-business model that is increasingly implemented by large organisations in Australia and around the world to service its employees. To understand the factors affecting the adoption of B2E portals, discussion in this paper entails the development of an instrument from a rigorous analysis of literature, application of theories relevant to information systems studies, development of a research model and validation of factors using both qualitative and quantitative methods.

Due to its application to organisations, B2E (business to employee) has also been referred to as a type of e-management [47], and organisational and human resource management [22]. However, B2E is an e-business model [51] and therefore an information systems study and topic. The application of information systems theories and literature to guide the development of the research model and instrument presented in this paper is thus valid.

Seven important factors affecting the adoption of B2E portals highlighted in this paper include: ease of use; usefulness; compatibility; motivation; helpdesk; organisation support and attitude. This finding did not challenge the views expressed by the IT scholars and hence our observation is that even though B2E portals represent an innovative IT application that relies on web-technologies its use by employees is still governed by the principles which are well advocated in the IT and e-commerce literatures. Hence, our contribution to theory is the confirmation of the relevance of the existing frameworks in explaining the usage of B2E portals. However, further research will be undertaken with data from a larger population to validate the research model and the factors presented in this paper empirically. Finally, although the inclusion of two moderating factors (i.e. age and gender) was described in relation to developing the research model, the operationalisation of these factors was not explicitly discussed because these factors do not represent complex concepts and hence were not represented by multiple items and excluded in factor analysis. However, additional analysis is to be undertaken in future studies to measure the impact of these factors on portal usage. Such an analysis would be possible once further surveys are administered.

References


