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## Barriers for the implementation of knowledge management in employee portals.

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### Abstract

Employee portals are an opportunity to develop knowledge management inside organizations. In this context is crucial to determine the barriers that could potentially prevent the implementation of these systems. The study aims to establish the barriers that influence the intention of use of employee portals that embed knowledge management. We've used structural equation modeling to conduct an empirical study of four models, based on the main categories of barriers pointed in the scientific literature: characteristics of the innovation, properties of employees, properties of job and organizational factors. We choose the educational public sector in Spain, where knowledge management is a key factor. The results have found evidence on these barriers with the exception of some of them related to properties of individuals' category. We conclude the study with a set of recommendations for the developers that could help in avoiding the effects of such barriers.

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### 1. Introduction

An employee portal is defined as a single point of access to all services that an organization provides to its employees<sup>1</sup>. In public education, the portal offers the employee support for an organizational culture based on

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knowledge management and the acquisition and improvement of teaching skills. In this paper we analyze the barriers for implementing this kind of system.

Our main goal is the definition of the difficulties in the implementation of employee portals in educational government. We will start with the study of theoretical foundations that allow proposing a model and testing it empirically. The results will deduct the flaws inherent in the design and implementation of innovation: the resistance to change of potential users, the difficult transformation of work processes in a technological environment and poor management of change by the Administration, that are the elements that can determine the failure in the implementation of such employee portals.

### 1.1. Theoretical foundations

Knowledge management is a key factor for any organization<sup>2,3</sup>, especially for education, whose goal is its creation and dissemination. Knowledge management through governments' educational employee portals focuses on the acquisition and improvement of teacher skills<sup>4</sup> and the creation and maintenance of an educational repository<sup>5</sup>. The integration of knowledge and e-learning has been modeled previously in the scientific literature<sup>6,7</sup>. Although criticism about the overemphasis on IT of most of knowledge management efforts in all kind of organizations<sup>8</sup> the technology seems to be necessary for its implementation<sup>9</sup>.

An employee portal is a good way to improve the skills of teachers<sup>10,11</sup>. In this line, the use of technologies that can create collaborative networks generate a training environment based on sharing experiences and an open space for criticism and reflection on own and others' practices<sup>12</sup>.

The study of the possible barriers that a government can find to successfully implement an employee portal is based on a study on the subject<sup>13</sup>, performed on B2E portals in general and on the contributions of Angelopoulos et al<sup>14</sup>, centered on e-government. The scientific literature considered valid for studies on public sector works on B2E in the private sector, which should make small adjustments<sup>15</sup>. The biggest drawback, however to apply to our field of that work comes from the lack of development of a theoretical model consistent with the existing body of doctrine. That is, both the previous works merely indicate possible barriers but not the relationship between the different variables that involve these barriers. According to Rahim<sup>13</sup> we can identify four possible categories:

- Innovation: It refers to the characteristics of the site itself, which is the "innovation" that is implemented. In this context, we can highlight: low perceived ease of use, lack of perceived utility, high perceived risk. These three variables are the opposite side of three of the features most requested by users of a portal: the usability, usefulness and trust. In all three cases the basics are the perceptions of system users.
- Individuals' properties: The own characteristics of the users can determine the existence of barriers to the implementation of employee portals. More specifically, we can classify these factors into two groups: those that have to do with the reluctance to implement new technologies or changes in work procedures (such as lack of motivation, habits, belief structure and lack of confidence) and those related to the technological skills of the users (their innovation capacity and upgrade the level of skills and knowledge).
- Job properties: The organization, meanwhile, has to fulfill a dual role: providing the necessary technological resources and provide support to employees in a broad sense.
- Organizational factors: With respect to the properties of the job, the only factor identified in the study is the incompatibility with existing work practices.

The analysis of the proposed dimensions will rely on two theoretical pillars: the technology acceptance model<sup>16</sup> - TAM- and the theory of planned behavior<sup>17</sup> -TPB-. Additionally, there are two sources of barriers whose relationship with the TAM model and TPB theory is not so obvious: the individual properties and properties of the work. We rely on these wide used theoretical models even taking into account the recent controversy about their flaws. Several studies<sup>18,19,20</sup> have found that the link between behavioral intention and use is not obvious. Although the controversy is growing among the scientific literature about the use of TAM and TPB in information systems, increased complexity models like TAM3, UTAUT or UTAUT2 did not probe significant improvement in the explanation of the acceptance and use processes, when are compared to prior and more simple TAM-based models or TAM-TPB hybrid models<sup>21</sup>.

## 1.2. Research hypothesis

### 1.2.1. Technology acceptance model –TAM- and its application to our study.

In the present case, among the factors that influence the innovation dimension, we include low ease of use, lack of perceived utility and risk. As we have seen, it is easy to relate these variables through a model widely accepted as the TAM. We propose the following relations, including the influence of the risk and a factor that Rahim<sup>13</sup> has included as a characteristic of the individuals and that we propound as an antecedent of risk and perceived ease of use: the belief structure of individuals. The theory provides us with respect to these variables the following possible relations:

- Lower ease of use: The ease of use is one of the key factors in the TAM model. Whether ease of use is essential for the implementation success of a technological solution, the low ease of use is configured as a barrier that could prevent the effective usage of the system. It is conceptualized as an antecedent of the perceived usefulness and additionally could affect directly the intention to use.
- Lack of perceived usefulness: the other key variable in the TAM model is the perceived usefulness. In the proposed model, this perception is conditioned by the ease of use. As we stated in the case of the analysis of ease of use, lack of perceived utility is a principal barrier in the implementation of an information system technology-based as an employee portal.
- Perceived Risk: The risk perceived by users is an important factor to understand the reluctance to use technology<sup>22</sup>. The risk may affect both: the perceived ease of use and perceived usefulness. In our case we have seen that the model works much better when the risk only acts as a possible antecedent of the perceived usefulness.
- Incompatibility of applications with the structure of beliefs of individuals: Computer anxiety or lack of technological comfort is defined as the tendency of an individual to feel apprehension, nervousness, stress, lack of trust and similar feelings towards the use of new technologies. The literature on the issue shows a negative relationship between this variable and the perceived ease of use<sup>23,24</sup>. Additionally, Rose and Fogarty<sup>24</sup> argue that it also has negative effects on perceived usefulness. With respect to the relation of the structure of beliefs of individuals and risk, Pavlou<sup>25</sup> indicates that the belief of having incomplete information about potential risks is an important factor to consider risk as a key element in the possible acceptance or rejection of a technology.

Based on this theoretical analysis, we enunciate the following hypotheses:

- H. 1: Lack of perceived usefulness is a barrier to the implementation of an employee portal.
- H. 2: Lack of perceived ease of use is a barrier to the implementation of an employee portal.
- H. 3: Perceived risk is a barrier to the implementation of an employee portal.
- H. 4: The structure of beliefs of individuals can affect the intention to use an employee portal in education.

### 1.2.2. The theory of planned behavior -TPB- and its application to our study.

Lack of organizational support is a concept related to the support from the organization perceived by its employees or POS -Perceived Organizational Support-, one of the variables defined as a key element of the theory of planned behavior. It is the extent to which they perceive that the organization is making efforts to improve their working and living conditions. In the TPB, organizational support is positively related to proactive behavior towards the organization or the willingness of employees to perform actions on behalf of the organization over the mere fulfillment of their duties.

Bharadwaj and Menon<sup>26</sup> point to the provision of resources for new ideas as a key element in innovation. Some important resources may be the existence of databases, data transfer methods and documentation or the availability of communication channels<sup>27</sup>. The lack of financial sources to provide funds for the implementation and maintenance of employee portals also determines its quality and therefore its acceptance. A limited supply of resources can be understood as a lack of concern by the Administration on the success of the website and therefore as an antecedent of perceived lack of organizational support.

As a result of the commented in the preceding paragraphs we state the following hypotheses:

- H. 5: Inadequate provision of resources by the government is a barrier to the implementation of employee portals in the public sector.
- H. 6: Lack of perceived organizational support is a barrier to the implementation of employee portals.

### 1.2.3. Individuals' properties

In this section we analyse different aspects related to personal characteristics of individuals and which may affect the intention of the use of the portal. The different evolutions of the TAM model usually incorporate most of these factors as antecedents of perceived usefulness or perceived ease of use, but following the essence of the previous classification we will study them in a separate model:

- Innovative capacity of individuals: innovative capacity is an essential element for innovation<sup>28</sup>. The motivation, the skills and knowledge are the antecedents that Marques et al<sup>29</sup> mention as determinants of innovative capacity.
- Lack of trust in applications: It refers to the possibility that the system may not function properly. Lack of trust is seen as a possible barrier to collaboration among employees, which is essential to generate innovative capacity<sup>30</sup>.
- Low updating of the individuals: Gallivan finds a strong correlation between the level of technical and analytical skills of individuals and their innovative capacity<sup>31</sup>.
- Intrinsic motivation of individuals: Reward systems for employees of the organization to adopt new technologies relate to this dimension<sup>32,33</sup>. The scientific literature handles concepts like cognitive absorption or playfulness, defining them as antecedents of perceived ease of use, intention and usefulness in the context of the model TAM<sup>34,16</sup>. However, in our work, its insertion into the set of barriers related to TAM model provided poor results. With regard to the influence of motivation on innovation processes within the company in general and on the innovative capacity of individuals in particular there is an extensive literature<sup>35</sup>.

From the analysis conducted we propose the following hypothesis:

- H.7.: The lack of innovative capacity of individuals is a barrier to the implementation of an employee portal.
- H.8.: Lack of motivation negatively affects the implementation of an employee portal.
- H9: Lack of trust adversely affects the intended use of the employee portal.
- H10: Lack of update is a barrier to the implementation of an employee portal in this area.

### 1.2.4. Job properties

Under this category, there is only one dimension: the incompatibility with existing work practices. A recurrent theme in the literature on implementation of employee portals is the need for organizational change to make them compatible with the functioning of these structures. In the same direction McDermott and Stock<sup>36</sup> suggest that a high degree of bureaucracy or a rigid hierarchy hinder innovation. Damanpour and Gopalakrishnan<sup>37</sup> cite over-centralization as another barrier.

Therefore, we hypothesize:

- H11: The properties of the work performed are a barrier to the implementation of employee portals in public education.

## 2. Methodology

We conducted a survey of teachers in primary and secondary schools in Spain that obtained 580 valid questionnaires, a response rate of 82%. Analyzing the distribution of the sample by gender, 54% of the respondents are women, which is consistent with the sex distribution of the professionals in the Spanish educational system. In all cases, Hoelter's test exceeds the critical values.

The questionnaire is composed of 37 items, using a Likert scale. It was developed adapting items previously tested in several studies.

Table 1. Sources of questionnaire's items.

Items of the questionnaire	Dimension	Sources
Items 1-11	Innovation	Davis et al., 1989; Cases, 2002
Items 12-29	Individuals' properties	Schillewaert & Ahearne, 2001; Davis et al, 1992; Ram, 1989; Nandhakumar et al, 2004; Wagner, 2002.
Items 30-32	Work properties	Ram, 1989; Beatty et al., 2001
Items 33-37	Organizational factors	Igbaria, 1990; Thompson et al., 1991; Schillewaert & Ahearne, 2001; ; Eisenberger et al., 1986

The reliability and validity of the measurement instrument have been evaluated using validation criteria and the calculation of Cronbach's alpha to measure internal consistency. The value obtained, 0.85 is well above of the common value (0.7 or 0.8) required.

The research study is structured through four structural equation models, that are coincident with the areas defined in the previous sections. The resulting models in AMOS software are recursive. In all four models  $\chi^2$  and other indexes (GFI, AGFI, RMR and PGFI) are in the recommended values.

### 3. Results

According to the empirical analysis, the results can be grouped around four specific areas: the relationships that are deduced from the TAM model, those derived from the application of the TPB theory, which are related to the properties of individuals and those generated by the properties of the job. From the combined analysis of these results we can conclude the acceptance or rejection of the hypothesis that we have proposed.

As can be seen, the basic relationships of TAM are empirically supported in our model:

- The structure of beliefs of individuals affects the perceived risk, which in turn determines the perceived ease of use.
- The perceived ease of use affects perceived usefulness.
- The structure of beliefs affects perceived usefulness directly.
- Perceived usefulness affects the intended use.

Table 2. Potential barriers related to TAM.

	Estimates	SE	Critical Ratio	P
Risk $\leftarrow$ Beliefs' structure	0.793	0.147	5.394	***
Perceived ease of use $\leftarrow$ Risk	1.168	0.187	6.237	***
Perceived usefulness $\leftarrow$ Perceived ease of use	0.430	0.097	4.430	***
Perceived Usefulness $\leftarrow$ Beliefs' structure	0.617	0.157	3.923	***
Intention of use $\leftarrow$ Perceived usefulness	0.942	0.116	8.135	***

So we will verify the hypotheses H1, H2, H3 and H4.

Additionally, variables identified in the theory of planned behavior are reflected in the results of our study as follows: Lack of resource provision is perceived as lack of support for the organization and this significantly influences the intention to use. Therefore, we accept the hypothesis H5 and H6.

Table 3. Potential barriers related to TPB.

	Estimates	SE	Critical Ratio	P
POS $\leftarrow$ Beliefs' structure	0.429	0.086	4.962	***
Intention of use $\leftarrow$ POS	0.941	0.147	6.381	***

The results show that the innovative capacity of individuals affects the intention of the use of the portal. We can't instead say that motivation affects the intended use of the portal. Therefore, we accept H.7, and we reject the hypothesis H.8, H.9 and H.10.

Table 4. Potential barriers related to individuals' properties.

	Estimates	SE	Critical Ratio	P
Awareness ← Motivation	0.930	0.369	2.522	0.012
Awareness←Trust	-0.494	0.712	-0.694	0.488
Innovative capacity←Trust	1.285	0.715	1.797	0.072
Innovative capacity←Awareness	0.308	0.189	1.629	0.103
Innovative capacity ← Motivation	-0.133	0.412	-0.323	0.747
Intention of use ← Innovative capacity	0.828	0.238	3.484	***
Intention of use ←Motivation	0.121	0.171	0.709	0.478

Factors that we have called job's properties influence the usage intention and therefore we accept the hypothesis:

- H. 11: The properties of the work performed are a barrier to the implementation of employee portals in public education.

Table 5. Potential barriers related to properties of the work.

	Estimates	SE	Critical Ratio	P
Intention of use ←Job properties	0.791	0.108	7.323	***

#### 4. Discussion

Through the analysis conducted we propose a set of potential barriers:

- Flaws in the own design and implementation of the innovation.
- Resistance to the change of potential users.
- Difficult transformation of the work's processes in a technological environment.
- Ineffective management of the change by the government.

Table 6. Categorization of barriers.

Potential barriers:	Results obtained in the study.
Flaws inherent in the design and implementation of innovation.	The risk that the system does not meet the security demands of potential users.  The perception of the possibility of difficulties for the proper use of the portal, which makes potential users are reluctant to use because it is perceived as unhelpful.  The lack of perceived usefulness of potential users.
Resistance to change of potential users.	The beliefs' structure of users, which causes distrust their ability to use the system and further enhances the perceived risk.  The lack of innovative capacity of individuals who use the portal, which will result in a lower intention to use it.
Difficult transformation of work processes to a technological environment.	The characteristics of the work to be performed, which occasionally decrease the interest on the profits that can provide the portal and therefore reduce the intention to use it.
Ineffective management of change by the administration	A lack of resources by the administration, which will be seen as lack of support from it.  The very lack of perceived support, which makes the staff less willing to make personal actions favorable to the implementation of the system.

If we relate the results obtained with the proposed categories of barriers, we can raise the table 6. It is important to note, however, that the assignment of an outcome to one category or another corresponds to the main features that we defined in our study when propose the empirical model. However, the complex network of interactions that occurs between the variables makes the boundary between categories fuzzy sometimes. This happens, for example, in the perception of users of the difficulties in the proper use of the portal: although we have included within the barriers related to the defects of design and implementation, it is possible that this perception is profoundly influenced by the reluctance to change of the users.

## 5. Conclusions

The conclusion of our work is a set of recommendations to the government seeking to implement successful employee portals and avoid these barriers, which are:

- To provide security guarantees to its employees: explicit confidentiality protection and implementation of measures to make visible the collective security involved.
- Increase the usability of the system: the training activities for understanding the functioning of system and the benefits it provides will improve the perception of the ease of use and its usefulness in general.
- Ensure necessary support about the functioning of the Portal: The resources allocated to the portal and the transparency and information on them, improve the image of the Administration and their employees are more willing to cooperate in the implementation (Alter, 2010; Bertot, Jaeger and Grimes, 2010).
- Improving the innovative ability of users: they need to have access to training resources and knowledge generated throughout the organization.
- Changing the internal processes of government agencies to integrate the portal naturally into the work of employees and not being perceived as a strange or disruptive element of natural procedures.

We therefore conclude that an Administration that seeks to implement a successful system has to provide security for its employees, ensuring the confidentiality and taking action to make this security visible for involved groups. Also, training actions about the understanding of the functioning of the system and the benefits that it provides, will enhance the perception about the ease of use and its overall usefulness. In the same vein the resources allocated to the portal and the transparency and information on them, improve the image of the Administration and their employees are more willing to cooperate in the implementation. Additionally, to enhance the innovative capacity of individuals is necessary the access to training resources and knowledge generated throughout the organization. Finally, and as we have repeatedly pointed out, a change in the internal processes of government is needed for the portal integrates naturally into the work of employees and not being perceived as a strange or disruptive element of natural processes of work.

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