

# THE KEY SUCCESS FACTORS AFFECTING KMS ADOPTION: QUANTITATIVE RESULTS

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## 1. Introduction

The topic of KM is one of the most discussed in the IS field at the moment. Many researchers and practitioners have studied this subject providing interpretative models, suggesting approaches to increase effectiveness and efficiency in KM as well as proposing and developing solutions implementing such approaches. The software vendors, that have been offering KM solutions since the half of the nineties, have recently put new efforts in the commercial push of KMS, also exploiting the new wave of eLearning systems. The consequent availability of a plethora of new or evolved KMS solutions in the software market justifies the interest many researchers have been devoting to this matter.

The academic point of view about the future of KM and KMS is well represented by the work of Argote et al. (2003), who have recently identified a set of emergent issues for the development of research in this field. They highlight, among the others, the “importance of social relations in understanding knowledge creation retention and transfer” and “the fit between properties of knowledge and properties of relationships in a social system”. With respect to the past, they point out the need to shift the interests of the academy from single to multiple relations dealing with the knowledge management process.

The complementary standpoint of the practitioners has been effectively synthesized by Smith et al. (CAIS 2003) who have recently collected opinions and expectation of chief knowledge management officers (CKO). According to the study, CKOs are confident that the development of KM systems has come to a turn point, where investments in implementation of new KM tools and methodologies should be replaced by initiatives aiming at leveraging investments (both in the organizational structure and in ICT) companies made in the past.

Such indications suggest to concentrate the efforts of the research towards the achievement of a better and eventually complete understanding of the factors that influence the effectiveness and efficiency of a KMS as socio-technical systems.

The first step in this direction is to adopt a widely accepted definition of KM. The work of Alavi et al. (Alavi and Leidner 2001) seems to be suitable to this end: among the taxonomies they

presented in their study, they proposed a threefold subdivision of the most diffused IT applications for KM based on their main finalization: (1) to code and share best practices, (2) to create corporate knowledge directories, (3) to create knowledge networks.

In this work we refer to such categories and, more precisely, we center our analysis on the first one. Thus, the aim of this work is to contribute to the improvement of the effectiveness of applications devoted to the codification and sharing of knowledge. In order to do so, it was necessary to perform a multi-staged research process that combined theoretical analyses and empirical investigation, both qualitative and quantitative, to design and test a research model. If the theoretical analyses and the qualitative investigation have been already presented (Bourdon, Vitari et al. 2003), in this article we now present a first quantitative statistical validation of our research. We recall our previous article for the description of the literature review and the qualitative investigation outputs, and so forth in this article we start with the definition of the research model. The description of the research method is contained in the following session. The presentation of the data analysis follows, while the discussions on the results of the data analysis conclude the article.

## **2. Research model**

### **Dependent variable**

For the development of the research model of this study an unavoidable prerequisite was the definition of “success” of a KMS, i.e. the identification of the factors affecting its success. On this subject, our theoretical analyses conduct to the recognition of the *usage* of an information system as a close proxy of the concept of *success* of an IS. Focusing on KMS and in accordance to theoretical and qualitative outputs we decline usage into the contribution of the solutions and best practices into the KMS as the most relevant type of usage affecting the success of the KMS and so forth as our dependent variable.

### **Independent variables**

While the scheme supporting the assessment of the “success” of a KMS results from the convergence of different researches, identifying the determinants of such success is a more challenging task. Our investigations indicate a heterogeneous set of potential factors affecting the success of the KMS. Among all the identified factors, we focus our attention and our statistical validation attempt on the most preeminent factors outcome by the theoretical and qualitative research (Figure 1).

### **Perceived usefulness (PU)**

Fishbein (Fishbein and Ajzen 1975) claimed that adopting a behavior is an indirect consequence of the beliefs related to the consequences of such behavior and of the evaluation of those consequences. This general statement has been diffusely applied to the field of ICT adoption and we apply it to the KMS adoption. We conceive PU as a multidimensional construct composed by: *individual* PU and *organizational* PU. The former refers to personal beliefs of individual job performance enhancements, the latter refers to personal beliefs about organizational business performance enhancements, both influencing the *attitude* and the *behavioral intentions*.

H10: There is a positive relationship between *perceived organizational usefulness* and *attitude*.

H11: There is a positive relationship between *perceived organizational usefulness* and BI.

H12: There is a positive relationship between *perceived individual usefulness* and *attitude*.

H13: There is a positive relationship between *perceived individual usefulness* and BI.

### **Perceived ease of use (PEOU)**

Davis [Davis Bagozzi 1989] defines *perceived ease of use* as the “degree to which the prospective user expects the target system to be free of effort”. More recent studies (Moore and Benbasat 1991; Adams, Nelson et al. 1992; Taylor and Todd 1995; Venkatesh and Smith 1999) and our qualitative analysis have confirmed the relevance of PEOU in explaining the usage of an IS, through the mediation of *attitude*, PU and *behavioral intentions*.

H6: There is a positive relationship between PEOU and BI.

H7: There is a positive relationship between PEOU and *attitude*.

H8: There is a positive relationship between PEOU and *perceived organizational usefulness*.

H9: There is a positive relationship between PEOU and *perceived individual usefulness*.

### **Social influence**

*Social influence*, i.e. the individuals’ attitude to influence the users of a system, is a factor included in many different theoretical models on ICT usage (Fishbein and Ajzen 1975; Davis 1989; Moore and Benbasat 1991; Thompson, Higgins et al. 1991; Compeau and Higgins 1995; Taylor and Todd 1995; Limayem, Bergeron et al. 1997; Karahanna, Straub et al. 1999) and highlighted by the qualitative phase of our research. *Social influence* affects the individual behavior by means of a moderating variable, the *subjective norms*, that reflect one individual’s willingness to adopt a behavior as a consequence of someone else’s opinion (Ajzen 1991). Taylor suggests decomposing *social influence* to take into account the divergent opinions of individuals the user is in relation with. The individuals the user is in relation with can be classified into *groups of influence* and by our qualitative study we are inducted to consider the groups: of the superiors and of the peers. So

forth, we hypothesize that superiors' influence and peers' influence affects the *subjective norms* while *subjective norms* act on PU and *behavioral intentions*.

H1: There is a positive relationship between superiors' influence and *subjective norms*.

H2: There is a positive relationship between peers' influence and *subjective norms*.

H3: There is a positive relationship between *subjective norms* and *perceived organizational usefulness*.

H4: There is a positive relationship between *subjective norms* and BI.

H5: There is a positive relationship between *subjective norms* and *perceived individual usefulness*.

### **Attitude**

Fishbein (Fishbein and Ajzen 1975) defined *attitude* as “the learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object”. Numerous studies and our qualitative analysis demonstrate that the relationship between PE, PEOU and IS usage behavioral intention is mediated by a causal link involving users' *attitude* toward usage (Fishbein and Ajzen 1975), specially whenever IS usage takes place on a voluntary base, which is the case for knowledge management systems.

H14: There is a positive relationship between *attitude* and BI.

### **Behavioral intentions of use (BI)**

Fishbein (Fishbein and Ajzen 1975) defined *behavioral intentions* (BI) as the “strength of one's intention to perform a specified behavior” and we consider BI as the only factor directly influencing IS usage.

H15: There is a positive relationship between BI and *contribution*.

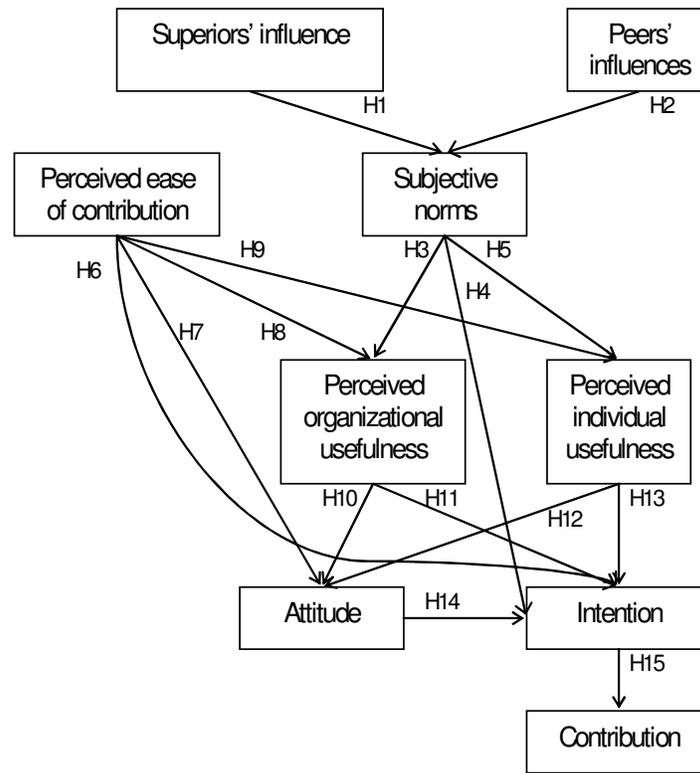


Figure 1 Research model

### 3. Research method

To examine the hypothesized model a field study technique was employed. The research site and instrument development and validation are described next.

#### Research site

The enterprise that granted the site for the field research is one of the world's largest providers of consulting, technology and outsourcing services. It employs approximately 52.700 people worldwide and produce more than 7 billion euros of global revenues. The survey took place at the Italian subsidiary that has six headquarters, spread over the country, employing 1,300 professionals and producing 115 million euros of revenue.

With its huge mobile workforce, the consultants, who spend most of their time at the customer's sites, it reflects the organizational characteristics of a typical consulting company. The mobile nature of their work cause a lack of stable offices making them dependent on ICT for getting their work done (Sussman and Siegal 2003). In facts, Italian subsidiary professionals do their work away from the office and they keep in touch with their colleagues mainly through their mobile phones and

the Internet. Especially, they can access the intranet enterprise portal, which includes the KMS, directly from their notebooks wherever they are.

The current KMS is a web-based application which totally possess the necessary KMS functions cited by Alavi (Alavi and Leidner 2001): coding and sharing best practices, creating corporate knowledge directories and creating knowledge networks. Coding and sharing best practices and problems' solutions are obtained through voluntary contributions (Goodman and Darr 1998) by consultants. The submitted contributions are immediately stored in a knowledge base and shared worldwide within the group where, every consultant could accesses these information simply interrogating the KMS search engine. They contribute mainly submitting reports and documentation concerning the projects they have worked on and they extract contributions concerning projects which are similar to the one they are working on, in order to find out solutions and best practices that other consultants contribute to the system.

The Italian subsidiary accepted to take part in the survey to increase the use of the systems showing to the consultants the advantages they could obtain from its adoption.

### **Instrument development**

Literature review was undertaken to identify and categorize the existing measures suitable for evaluate the proposed model. For each construct the existing scales were identified and then adjust to be applied to the specific research field.

### **Dependent variable**

The reviewing process about contribution construct resulted in a two-item five-point Likert scale that aims at evaluate the feeling about the idea to contribute to KMS and a open question asking the average number of contributions to the KMS done per week during the last month.

### **Independent variables**

The construct concerning the independent variables were all defined using five-point Likert scales (Table 1).

Construct	Num of items	Scale ranges	References
Behavioral intentions	2	from strongly agree to strongly disagree	(Davis 1989; Taylor and Todd 1995)
Perceived ease of contribution	3	from strongly agree to strongly disagree	(Davis 1989; Taylor and Todd 1995; Legris, Ingham et al. 2003)
Individual perceived usefulness of contribution	4	from strongly agree to strongly disagree	(Davis 1989; Taylor and Todd 1995)
Organizational perceived usefulness of contribution	3	from strongly agree to strongly disagree	(Davis 1989; Taylor and Todd 1995)
Subjective norms	2	from strongly agree to strongly disagree	(Thompson, Higgins et al. 1991; Compeau and Higgins 1995; Taylor and Todd 1995; Limayem, Bergeron et al. 1997)
Superiors' influence	4	from strongly agree to strongly disagree	(Thompson, Higgins et al. 1991; Compeau and Higgins 1995; Taylor and Todd 1995; Limayem, Bergeron et al. 1997)
Peers' influence	4	from strongly agree to strongly disagree	(Thompson, Higgins et al. 1991; Compeau and Higgins 1995; Taylor and Todd 1995; Limayem, Bergeron et al. 1997)
Attitude towards contribution	4	from good to bad, wise to foolish, positive to negative and pleasant to unpleasant	(Fishbein and Ajzen 1975; Triandis 1980; Taylor and Todd 1995; Agarwal 2000)

Table 1 Independent constructs

## Data collection and descriptive statistics

Before administered the questionnaire we undertook several conversations with the Italian subsidiary CKO to adjust the terminology in order to best fit the organizational context. After the revision, the questionnaire was administered to 1.200 Italian employees spread over the country. We decided to administer it by publishing it on-line on the university's server on a web page accessible from all the employees and the questionnaire was promoted through different ways, emails, placards, phone calls, in order to maximize the response rate.

## Sample description

The employees that filled in the questionnaire were 103 located in different cities spread across the country. They were 75% men and 25% woman and the 65% of them ranged from 30 to 39 years old. They usually contribute to the KMS only 0.82 time per week during the month before the survey with a 2.24 standard deviation. Clerks are the hierarchy level that contributes more than middle and top management. The 46% of employees that contribute to KMS have worked in the Italian subsidiary from 1 to 5 years.

#### 4. Data analysis and results

Data analysis was carried out with a two-stage methodology: first the questionnaire was validated and then Structural Equation Model (SEM) was applied in order to test the model. SPSS® 11.5 and AMOS®4.0 were used for data analysis: next sections describe the steps of the procedure.

Table 2 shows the variances of the model's constructs. All such values approximate 1, thus revealing a good discriminant power of the constructs.

Constructs	Mean	Std. Dev.
Attitude towards contribution	1.9935	.70239
Perceived ease of contribution	2.4673	.93814
Perceived individual usefulness	2.6287	.96354
Perceived organizational usefulness	2.1830	.89076
Subjective norms	3.0099	.89994
Superiors' influence	3.5523	.74682
Contribution	3.9078	1.08634
Intentions	2.6990	1.08542

Table 2 Descriptive Statistics

To check the convergent and discriminant validity of the constructs, Principal Component factor Analysis (PCA) and Cronbach's  $\alpha$  reliability test were used (Table 3). Item loadings and internal consistencies are considered acceptable for values greater than 0.70 (Gefen, Straub, et Boudreau, 2000) and all the scales tested resulted acceptable, with the lowest value at 0.72, except for subordinated influence that, with an  $\alpha$  at 0.63, was dropped.

Constructs	Reliability ( $\alpha$ )
Contribution	.87
Intention	.79
Perceived ease of contribution	.86
Perceived Individual usefulness	.86
Perceived Organizational usefulness	.72
Superiors' influence	.73
Subjective norms	.73
Attitude towards contribution	.80

Table 3 Construct Reliabilities

To test the convergent and discriminant validity of the measurement model, we used Confirmatory Factor Analysis (CFA) procedures (the results are shown in Appendix A). Once the measurement model was operating adequately, we proceeded in testing the hypothesized structural model through AMOS®4.0. The model's construct was revised by dropping items, one at a time, according to Churchill's scale development paradigm (Churchill, 1979; Igalens et Roussel, 1998).

Convergent validity was tested with regard of estimate standardized regression weights which must be over 0.5, with critical ratio over 1.96. Every items dropped was dropped only after verifying that the residual variance also made sense from a theoretical perspective. The test for constructs' unidimensionality confirmed this characteristic for all the constructs used in the model.

The structural model was examined on the cleansed measurement model. The fit indexes evaluated through SEM analysis were all outside the accepted thresholds: the Normed Fit Index (NFI) was 0.911, the Comparative Fit Index (CFI) was 0.952, the Root Mean Square Error of Approximation (RMSEA) shows a value of 0.102 and the Expected Cross-Validation Index (ECVI) was 9.005.

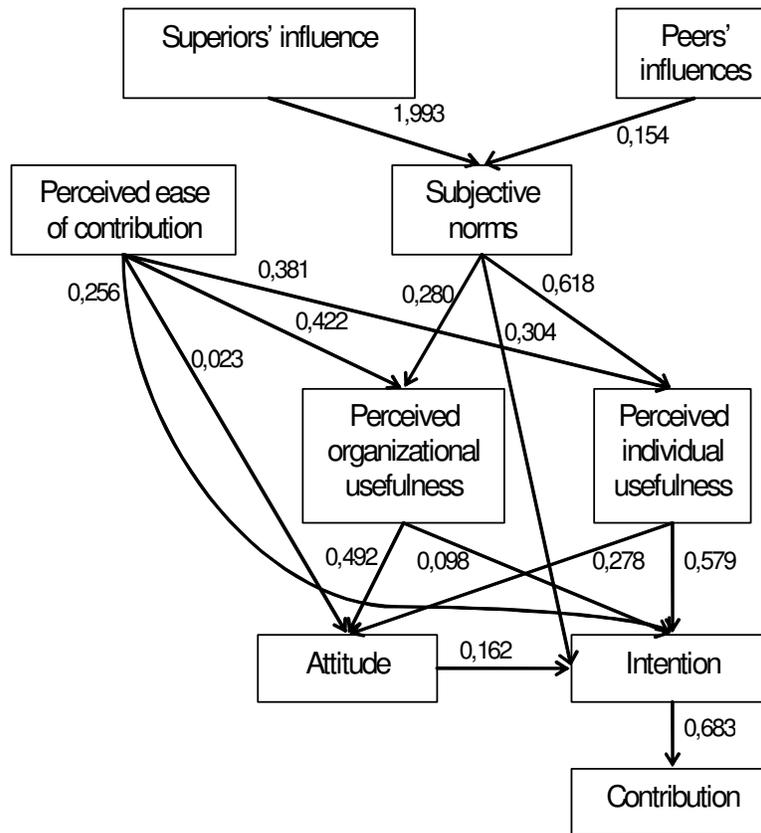


Figure 2 Paths

## 5. Discussion and conclusion

Figure 4 shows the standardized path coefficients. According to the hypothesized model and previous researches, this study confirms the TAM with the addition of the external variables we introduced. The paths that appear to be more significant are those between superior's influence and subjective norms (1,993), subjective norms and perceived individual usefulness (0,618), perceived

individual usefulness and intention (0,579) than finally between intention and contribution (0,683). In fact, the highest regression weights were computed for the paths described. One could justify such result from a theoretical point of view by considering that users are driven to adopt a system firstly for the indirect pressure they were subjected through the thought (subjective norms) about people hierarchically superior will on contribution. The rest of the model does not show values of the regression weight that high, (they range from 0,023 to 0,492), providing weak support to each of the remaining hypotheses of the model.

As a matter of fact, the intention to contribute of potential users seems to be directly related to their own perception about the personal usefulness on contribution. So forth, the research suggests that to improve the success of a KMS, the organization should improve this perception. This imperative appears reachable mainly through the norms that each individual establish on his own. Subjective norms, in turn, appear influenced by the superior will about system usage and the importance of contribution. Therefore, people hierarchically superiors should show high level of commitment on KMS usage.

Despite these results, the structural equation modeling analysis reveals some evidence of misfit in the model as a whole. The TAM modified with the addition of peers' influence, superiors' influence, subjective norms and the split of perceived usefulness in organizational and individual, doesn't adequately describe the acceptance and the usage of KMS system.

Provided with information related to both model fit and possible areas of model misspecification, we will undertake two main tasks. The former will imply specifying the original hypothesized model through the post hoc analysis. Estimating the modification indexes, it will suggest the factors that have to be dropped from the model and the new paths that have to be created in order to improve the goodness-of-fit statistics described above. The latter could be the questionnaire submission to a new and large-size sample owing to some of the goodness-of-fit statistics estimated that have the tendency to underestimate fit in small samples.

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