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Analysing the impact of a business intelligence system and new conceptualizations of system use

Impact of a
business
intelligence
system

345

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Abstract

Purpose – In this study, three models were empirically compared, the DeLone and McLean model, the Seddon model and the Modified Seddon model, by measuring the impact of a business intelligence system (BIS) in companies in Peru. After that, the mediators and dependent constructs were analysed to determine if they were behaving properly (a good level of variance explanation and significant relations with others constructs). The study used a sample of 104 users of the BIS, from companies in several important economic sectors, in a quasi-voluntary context and with six constructs: information quality, system quality, service quality, system dependence (system use), user satisfaction and perceived usefulness (individual impact).

Design/methodology/approach – To interpret the results, the authors used structural equations. The idea was to look for the best fit and explanations for the outcomes. The main difference in these models is that the DeLone and McLean model considers system dependence (system use) as a part of information system success, but in the Seddon model, it is a consequence of it.

Findings – The Seddon model seems to show the best fit and explanation for the outcomes. After that, a review of the system use construct was realised, because of its limited variance explained and the few significant relations with other constructs, to improve its explanation power in future research.

Research limitations/implications – It is estimated that the sample includes more than 15 per cent of all the companies that use a BISs in Peru, so the size of the sample is adequate, but it is not entirely random and therefore limits the generalizability of outcomes. Besides that, a sample size that is bigger could be better for the sake of making a more detailed analysis, permitting the use of some items with less power, or the use of another statistical procedure for structural equations such as the Asymptotical Distribution Free, permitting a more detailed analysis (Hair *et al.*, 2006).

Originality/value – Business intelligence (BI), one of the most important components of information systems (IS), is playing a very relevant role in business in this time of high competition, high amounts of data and new technology. Currently, companies feel pressured to respond quickly to change and complicated conditions in the market, needing to make the correct tactical, operational and strategic decisions (Chugh and



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Grandhi, 2013). BI is one of the most important drivers of the decade (Gartner, 2013). Big companies of IS are creating special units specialised in BI, helping companies become more efficient and effective in daily operations.

Keywords DeLone and McLean model, Seddon model, System use construct, Impact of a business intelligence system

Paper type Research paper

1. Introduction

Business intelligence (BI), one of the most important components of information systems (IS), is playing a very relevant role in business in this time of high competition, high amounts of data and new technology. Currently, companies feel pressured to respond quickly to change and complicated conditions in the market, needing to make the correct tactical, operational and strategic decisions (Chugh and Grandhi, 2013).

BI is one of the most important drivers of the decade (Gartner, 2013). Big companies of IS are creating special units specialised in BI, helping companies become more efficient and effective in daily operations. The field of BI is evolving at a fast speed, to become more innovative and obtaining knowledge of the data stream in a way never before done. Today innovative programmes of BI in all industries are being implemented (Chen *et al.*, 2012; Sharda *et al.*, 2014). A company that uses a business intelligence system (BIS) can be more effective and efficient and can disseminate knowledge inside the company, with business partners, improving the decision-making process and making the enterprise more competitive (Parzinger and Frolick, 2001). Measuring the impact of BIS is very important to get the best outcomes and increase the investment return rate.

In the last 40 years, there have been developed several models to measure the impact of IS. We could mention Theory of reasoned action (1975-1980), Theory of planned behaviour (1985), Technology Acceptance model (1986), User involvement (1984), Delone and McLean (1992), Seddon model (1997), Soh and Markus (1995), the modified model of Delone and McLean (2003), and others (Gonzales, 2008).

From these models, the more relevant has been the Delone and McLean (1992/2003) and its contrasting model, the Seddon model of 1997. We have used the operationalisation of Rai *et al.* (2002) to compare both models (the name of the construct Use is changed by System Dependence, and for the construct, Individual Impact is changed by Perceived Usefulness). In this case, we are comparing the two models and a Modified version of Seddon, in a BIS, used by “real” professionals of IT in “real” situation of several Peruvian companies using that system.

An additional point to review is the construct System Use (System Dependence in this paper), that is a construct that has not been performing well in these Information System Success models.

The objective of this study, as previously mentioned, is to compare the DeLone and McLean (2003) model and the Seddon (1997) model (with one additional variation), applied to a Business Intelligent System. The study was accomplished in Peru, a developing country in South America, by using a sample of 104 users for the system in 13 enterprises, having a quasi-volitional IS use context. After this analysis, the mediators and dependent constructs were reviewed to determine if they were behaving properly (a good level of variance explanation and significant relations with other constructs).

2. Literature review

2.1 The Delone and McLean information systems success model

Delone and McLean (1992) established a model that tried to measure the impact of the information system, considering six constructs. After ten years, DeLone and McLean (2003)

reviewed the model, weighing several studies that used partially or completely their model. They said that the model had fulfilled the main objective established: to obtain the information system success, through multidimensional and interdependent constructs. They modified the model considering the next constructs: information quality, system quality, service quality, system use or intention to use, user satisfaction and net benefits. The model can be observed in [Figure 1](#).

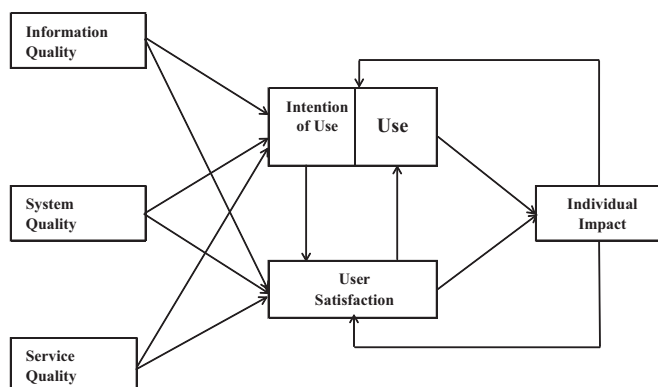
One of the independent constructs is Information Quality, and the variables related to it are accuracy, precision, output timeliness, reliability, completeness, relevance and currency. The second independent construct is System Quality, which recommends the consideration of variables such as performance of the system, trustworthiness of the computational system, on time and on-line response, and the ease of use of terminals ([Swanson, 1974](#)).

The third independent construct is Service Quality, which can be evaluated through technical competence of the IS staff, their attitude, their ability to complete the development of products and services on time, the span of time required to develop the systems. Marketing measuring tools such as SERVQUAL used to measure the dimensions of tangibles, responsiveness, assurance, reliability, and empathy ([Chen et al., 2000](#)).

In past years, several evaluations of the DeLone and McLean model have been made during studies that have been used partially or completely ([Petter et al., 2008](#)), corroborating most of the relations between constructs.

2.2 The Seddon information systems success model

The Seddon model (1997) tries to improve the DeLone and McLean (D&M) model from 1992. According to Seddon, the model was derived from the combination of a process models with another of variance. This model maintains a great part of the D&M model but is divided into two variance models, eliminating the process model. The first variance sub-model is the Partial Behavioural Model of IS Use. The second sub-model is the IS Success Model, a great part of the D&M model. Both models of variance are united, first from the Partial Behavioural model of IS Use, through the Individual, organisational, and Societal Consequences of IS Use, after that, from the IS Success model through the Partial Behavioural model of IS Use, from the User Satisfaction construct to the Expectations about the net benefits of future IS Use.



Source: DeLone and McLean (2003)

Figure 1.
DeLone and
McLean's model from
2003

The Partial Behavioural model of IS Use is composed of expectations about the net benefits of future IS Use construct, that is directly related to the IS Use construct (behaviour). The IS Success model is composed by three bodies. The first one is Measures of Information and System Quality, with System Quality and Information Quality constructs. The second body is General Perceptual Measures of Net Benefits of IS Use, with the Perceived Usefulness, and User Satisfaction constructs. The second body is Other Measures of Net Benefits of IS Use, with the net benefits for Individuals, Organisations, and Society. The constructs of the first and third body influence the constructs of the second body. Besides that, the Perceived Usefulness of the second body is directly related to the User Satisfaction construct. Finally, the User Satisfaction Construct offers feedback with construct Expectations about benefits for future IS Use, of the Partial Behavioural model of IS Use. The Seddon model can be observed in [Figure 2](#).

Seddon indicates that IS Use must be after impact and benefits because it does not cause them. It is affirmed by Seddon that IS Use is a behaviour that expresses a belief of goodness from using an information system. The Seddon model labels IS Use as behaviour caused by IS success. IS Use being a consequence of IS success. In relation to the construct System Use, this model was developed for volitional and non-volitional usage, in contrast to the DeLone and McLean model that solely assumes volitional use ([Rai et al., 2002](#)).

Several recent studies have used the Seddon model because it explains adequately the impact of an Information System ([Brown and Jayakody, 2009](#); [Kulkarny et al., 2006](#); and [Sabherwal et al., 2006](#)).

2.3 The modified Seddon information systems success model

[Rai et al. \(2002\)](#) used the DeLone and McLean model (1992) and the Seddon model (1997) to estimate the validity of both. It was found that both models exhibited a reasonable fit. They considered a third alternative, modifying the Seddon model. It was estimated that the perceived usefulness was related to individual impacts, considering that [DeLone and McLean \(1992\)](#) connected several constructs to individual impacts.

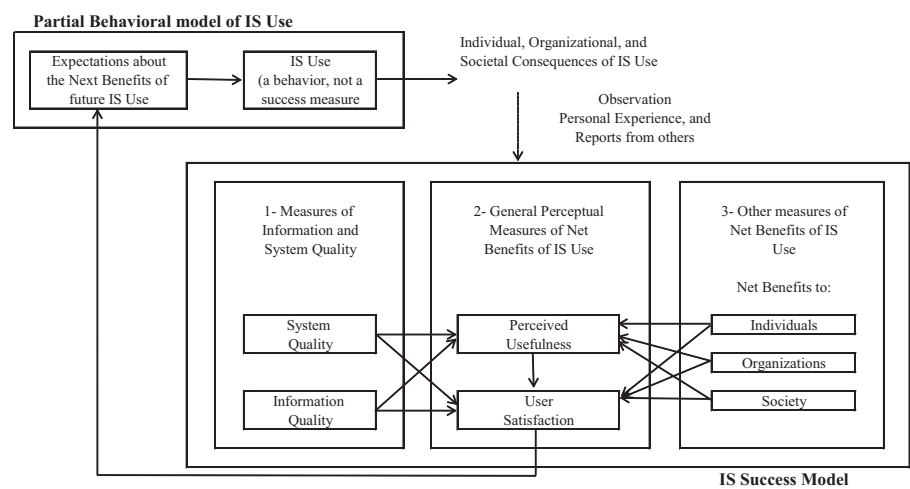


Figure 2.
The Seddon IS
Success model

Source: Seddon (1997)

In this way, Rai *et al.* (2002) established a model of five constructs: system quality, information quality, perceived usefulness (individual impact), user satisfaction and system use. Besides that, they represent system use in terms of system dependence. The Seddon model was modified, including a correlational path between system use (system dependence) and perceived usefulness, so the best fit and variance explanation would be obtained. The model can be observed in Figure 3.

The more relevant studies that analysed the impact of Information System and *Business Intelligence*, using the DeLone and McLean, and Seddon models could be observed in Appendix 1.

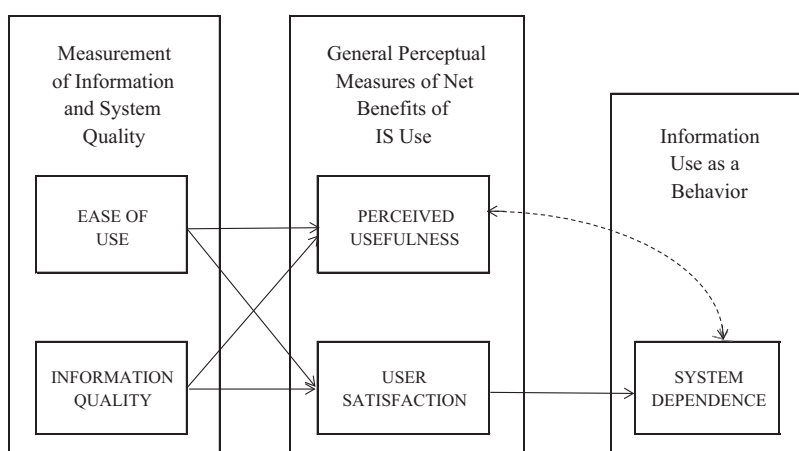
3. Methods

The models used are quantitative, in which the individual User of the BIS, in a company that employs the system, is the unit of analysis. A Pilot Test was employed to test the tools, the questionnaire, and the model. Structural Equations were used for the analysis. The model is analysed with the DeLone and McLean model, the Seddon model, and the Modified Seddon model.

The study sample includes the most important companies in the Peruvian economy from different economic sectors: banking, food industry, consumer marketing products, pension funds, government, beauty products, market research, and credit cards. The Use of BISs in those companies is not mandatory and users have other channels providing the information, but in general, it is more cumbersome and perhaps the data is not as precise for the analysis, so the BIS is assumed as quasi-volitional or quasi-mandatory.

4. Quantitative analysis

A previous analysis of the data was realised to check the main characteristics of them that could be observed in Appendix 2 and 3. Reviewing the correlation table we find that the correlations are between medium and high, and that is because the variables are related to business, and we are going to find high correlations between items of the same construct, but using structural equations of covariance (SEM) that is not a problem (Hair *et al.*, 2006).



Source: Rai *et al.* (2002)

Figure 3.
The modified Seddon
IS Success model

Several tests were implemented to check the all the requirement for a multivariate analysis: normal distribution, completeness of the data, outliers, homoscedasticity, and linearity between dependent variables and independent variable. The Kolmogorov-Smirnov test was applied to all variables to verify the normality ([Appendix 4](#)). The multivariate normal distribution was verified using the EQS programme for SEM, eliminating the variables that could not satisfy this requirement.

The data was complete for each one of the 29 items for the analysis. There were only a few descriptive variables that were incomplete. The homoscedasticity was checked through a homogeneity test of variance between the dependent variables and the independent variables and mediator variables, using the Barlett and Levene test. We found only two variables with problems: IIDU and IIWU and were corrected through a mathematics factor of elevating the variable to the cubic power and then divided by 7. To verify the linearity between dependent variables and independent variables, a regression was run for each combination, and then check a graphic representation of the residuals to verify the random distribution, with favourable outcomes.

We compare the DeLone and McLean model, the Seddon model and a modified Seddon's model, in a sample of companies that use BISs. The initial sample was of 110 surveys, but after eliminating some outliers, the final sample consisted of 104 ([Hair et al., 2006](#)). The measurement of the constructs was made using a seven-point scale (semantic differential, Likert, ordinal and ratio: [Iivari, 2005](#); [Hong et al., 2006](#); [Chen et al., 2000](#); [McKinney et al., 2002](#)). The questionnaire has 29 statements for the six constructs. The questionnaire was obtained from several sources, and it was translated three times. From English to Spanish, then from Spanish to English and then from English to Spanish, through different translators to fulfil the correct procedure in research.

The validity of the constructs was verified through face validity, convergent validity, discriminant validity, and nomological validity. All construct's validity statistics were considered satisfactory. The general reliability coefficients in the CFA and Structural model were satisfactory: Cronbach's alpha of 0.954 and Rho of 0.974. A pilot test was conducted with 68 observations to verify the questionnaire and apply the Exploratory Factor Analysis through Principal Components and Varimax rotation to verify that each item pertained to only one construct. The main results of the analysis could be observed in [Appendix 5](#).

4.1 Sample analysis

A standard procedure was performed, starting with the Confirmatory Factor Analysis (CFA), and thereafter the Measurement model was established. The estimated method used in structural equations was Maximum Likelihood Estimation, with the complementary method of Robust from the EQS programme.

The CFA was initially established, using all the observable variables. The fit of the model was modified, working with χ^2 , CFI, RMSEA, multivariate normal distribution adjustment, and the average variance extracted (AVE) ([Byrne, 2006](#)). Thereafter, the final Confirmatory Factor Analysis (CFA) was obtained with 22 items derived from 104 observations. The software used for the statistical analysis was Minitab, while the structural equations used EQS version 6.1. See [Table I](#) for statistics from the Confirmatory Factor Analysis.

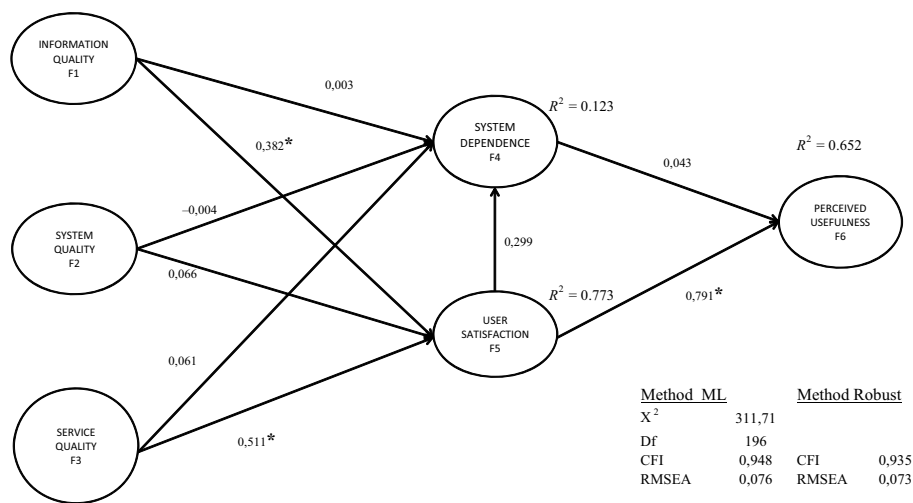
5. Results

After completing the Confirmatory Factor Analysis, the Structural Model was established. [Figure 4](#) presents the structural model found with the DeLone and McLean model, including the relations between constructs and the variance, explained for each dependent construct through R^2 .

Statistics – confirmatory factor analysis			Impact of a business intelligence system
Number of observations	104		351
Multivariate Kurtois	2.86		
<i>Method ML</i>			
Chi-squared	290		
CFI	0.956		
RMSEA	0.070		
<i>Method robust</i>			
Chi-squared	281		
CFI	0.946		
RMSEA	0.067		
<i>Average variance extracted</i>			
Information Quality	39.99%		
System Quality	54.41%		
Service Quality	53.36%		
System Dependence	51.97%		
User Satisfaction	70.74%		
Perceived Usefulness	61.86%		

Source: Own elaboration

Table I.
Main statistics of the confirmatory factor analysis



Source: Own elaboration

Figure 4.
DeLone and McLean structural model

In this case, a variance explanation of 65.2 per cent for Perceived Usefulness (Individual Impact), 77.3 per cent for User Satisfaction and 12.3 per cent for System Dependence (System Use) was obtained, and three significant relations were found (alpha 0.05). The independent constructs Information Quality and Service Quality have significant relations with the mediator construct User Satisfaction. Likewise, User Satisfaction has a significant relation

to the dependent construct, Perceived Usefulness (Individual Impact). In contrast, the independent construct System Quality does not have any significant relation to the mediator constructs. The System Dependence (System Use) construct shows no significant relation to the independent constructs or dependent construct. The dependent construct, Perceived Usefulness (Individual Impact), is explained in 65.2 per cent (R^2).

This model does not find any significant relationship between the System Dependence (System Use) and other constructs of the model, and it is worth considering that, as an indicator of the success of the system, it makes sense if it is voluntary or discretionary, and not when the system has captive users, who do not have an alternative system to process information (Lucas, 1978).

For the Seddon model, the next results were found (including the relations between constructs and the variance explained for each dependent construct through R^2), that can be observed in Figure 5.

In this second model, a variance explanation of 12.2 per cent for System Dependence (System Use), 80.3 per cent for User Satisfaction and 68.7 per cent for Perceived Usefulness (Individual Impact) and find five significant relations (alpha 0.05) are presented. The independent constructs Information Quality and Service Quality have significant relations with the mediator construct User Satisfaction. Likewise, User Satisfaction has a significant relationship with the dependent construct, System Dependence (System Use). The independent construct System Quality has a significant relationship with the mediator construct Perceived Usefulness (Individual Impact) and the Perceived Usefulness (Individual Impact) has a significant relation with the User Satisfaction construct. The dependent construct, System Dependence (System Use), is explained in 12.2 per cent (R^2).

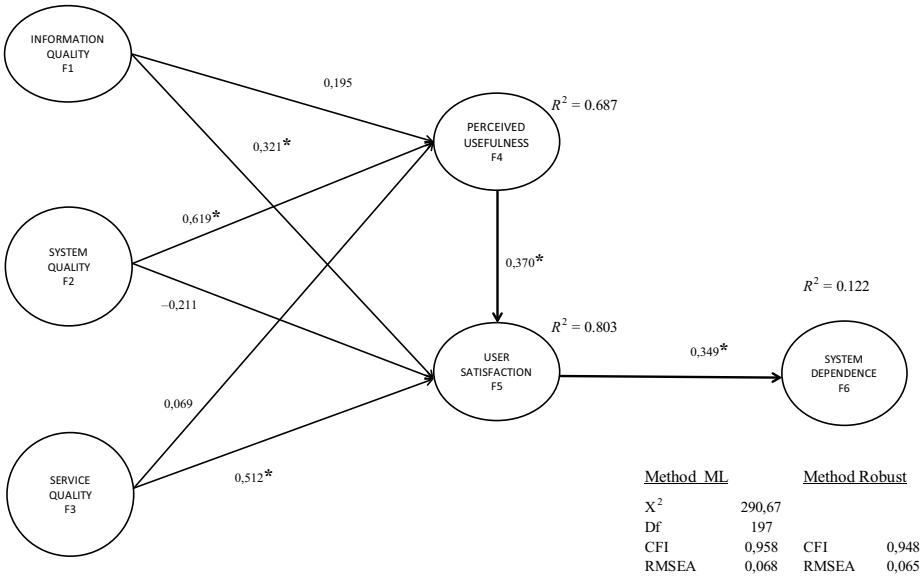


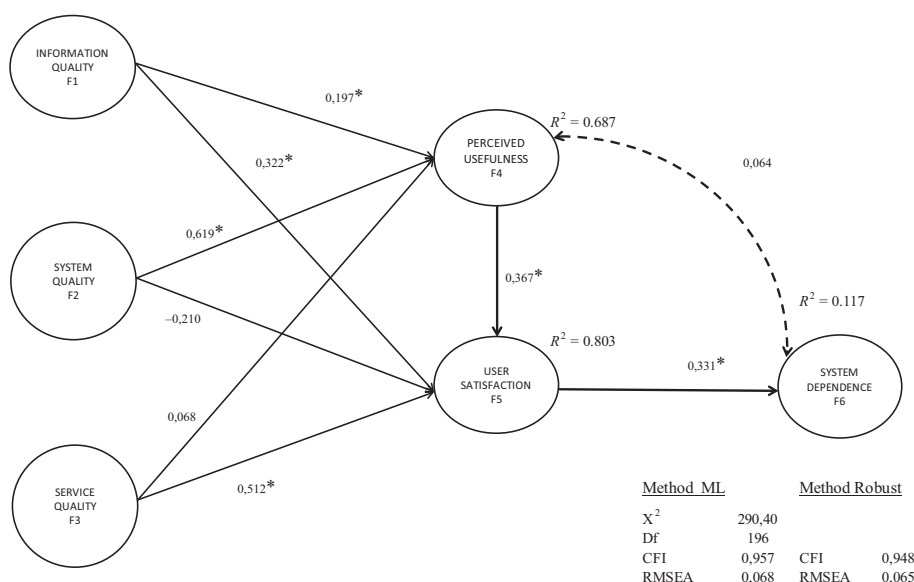
Figure 5.
Seddon structural
model

Source: Own elaboration

For the modified Seddon model, the next results were found (including the relations between constructs, and the variance explained for each dependent construct through R^2), that can be observed in Figure 6.

In this third model, a variance explanation of 11.7 per cent for System Dependence (System Use), 80.3 per cent for User Satisfaction and 68.7 per cent for Perceived Usefulness (Individual Impact), and six significant relations are presented (alpha 0.05). The independent constructs Information Quality and Service Quality have significant relations with the mediator construct User Satisfaction. Likewise, User Satisfaction has a significant relationship with the dependent construct, System Dependence (System Use). The independent constructs Information Quality and System Quality have a significant relationship with the mediator construct Perceived Usefulness (Individual Impact) and the Perceived Usefulness (Individual Impact) has a significant relation with the User Satisfaction construct. The dependent construct, System Dependence (System Use), is explained in 11,7 per cent (R^2).

We can compare the three models in the next Table II. The best model is the Seddon model; the second-best model is the Modified Seddon model, which is quite similar to the first model; and thirdly the DeLone and McLean model. The Seddon model has the best for CFI (0.958 against 0.957 and 0.948), RMSEA (0.068 against 0.068 and 0.076), R^2 of Perceived Usefulness (0.687 against 0.687 and 0.652), R^2 of User Satisfaction (0.803 against 0.803 and 0.791). The Seddon model explains the significance of the System Dependence construct in relation to other constructs of the model (like the Modified Seddon model), but the DeLone and McLean does not. The DeLone and McLean better explain System Dependence (R^2 of 0.123, against 0.122 and 0.117 for the other models). In addition, for the total number of significant relations between constructs, the Modified Seddon model explained six relations, against five for the Seddon model and three for the DeLone and McLean model.



Source: Own elaboration

Figure 6.
Modified Seddon
structural model

Table II.
Comparison of the
three models

Statistics	DeLone and McLean	Models Seddon	Modified Seddon
χ^2	311,71	290,67	290,40
Degrees of Freedom	196	197	196
Comparative Fit Index (CFI)	0.948	0.958	0.957
RMSEA	0.076	0.068	0.068
R^2 Perceived Usefulness (Individual Impact)	0.652	0.687	0.687
R^2 User Satisfaction	0.791	0.803	0.803
R^2 System Dependence (System Use)	0.123	0.122	0.117
R^2 Average explained	0.522	0.537	0.536
Significant relation of the System Dependence (System Use) construct with other constructs	No	Yes	Yes
Total significant relations between constructs	3	5	6

Source: Own elaboration

Some additional comparisons that we can make are with the study of [Rai et al. \(2002\)](#), in which there are various differences, especially with the DeLone and McLean model, but less with two models of Seddon. The main differences could be explained by the fact that the [Rai et al. \(2002\)](#) study was realised with students of only one university, and this study was realised with executives of the IT department of several companies ([Appendix 6](#)).

The other comparison is with [Wieder et al. \(2012\)](#), in which they found a significative relation (**) between User Satisfaction and BI Use (System Dependence in this study). In this study we found the same relation in two of the three models: there were no relation in the DeLone and McLean model, but there was a relation in the Seddon model (*) and the Modified Seddon model (*). Wieder et al. use a variation of the DeLone and McLean model, using PLS, that is less demanding than EQS (structured equations of covariance).

6. The system use construct (system dependence)

There are several studies related to system usage, user satisfaction and the individual impact that had controversial outcomes. Some authors indicate that there is a direct relationship between system use and individual performance ([Goodhue and Thompson, 1995](#)); others did not find any relation between those constructs ([Lucas and Spitler, 1999](#)). There is a direct relation between System Use and User Satisfaction ([Iivari, 2005](#); [Halawi et al., 2007-2008](#); [Bokhari, 2005](#); [D'Ambra and Rice, 2000](#)), and other authors indicate that there is not that relation ([Baroudi et al., 1986](#)). Other authors find a direct relation between System Use and the Individual Impact ([Halawi et al., 2007-2008](#); [Rai et al., 2002](#); [Yuthas and Young, 1998](#); [Guimaraes and Igbaria, 1997](#)). Other authors did not find that relation ([Gelderman, 1998](#); [Roldan and Millan, 2000](#)).

6.1 Voluntary and mandatory contexts

[Norzaidi et al. \(2008\)](#) examined the impact of user resistance on Intranet usage and its relation to performance in middle managers in an organisational context. They examined too, the cause and effect of usage and user resistance in a mandatory and in a voluntary usage. The study demonstrated that usage significantly explain the percentage of variance on the performance of managers. The outcomes of low resistance found in the study imply that the situation where managers are coerced to use Intranet because they do not have other alternatives to complete their jobs. Usage has been observed to have a strong effect on

manager performance, and that is one of the success factors that influence individual performance.

Eom *et al.* (2012) realised a study about the role of information technology in e-learning system success in a mandatory context, using PLS to analyse the results, and found a significant relationship between Use and Individual Impact. They compared this study with the research of Rai *et al.* (2002) that worked in a voluntary context and analysed the data with LISREL and found significant relationships between both constructs. Besides that, compared with the research of Iivari (2005) that worked in a mandatory context analysed the data with PLS, and found no significant relations between both constructs.

He and King (2008), investigated the role of user participation in IS through a meta-analysis and found that the construct Usage was initially thought to be a relevant in Voluntary contexts. As established initially by some researchers like DeLone and McLean (1992), but after that found that some researchers indicated that users still have power over the level of use, grounded on their personal ability (attitude and intention), and after that the variability of their usage qualifies the system use construct as a relevant one (Hartwick and Barki, 1994).

Hennington *et al.* (2009) studied the usage in an electronic medical record system in a mandatory context. They found that understanding the correspondence between key technological acceptance constructs and usage, needed a multidimensional abstraction of the use construct (time spent using the system, timing of use, and mode of use). Although they agreed with Burton-Jones and Straub (2006) for using, context-specific measures for the use construct, instead of using lean measures (time spent using the system); they found that lean measures might be sometimes appropriate for specific conditions.

As was mentioned previously, Petter and McLean (2009) realised a meta-analysis of more than 50 studies that utilised the DeLone and McLean model to determine the validity and explanatory power of the Use (System Use) construct. They indicated that this construct needs to be improved, to establish significant relations with other constructs, and explain the impact of an IS model.

6.2 New conceptualizations of the system use construct

Dishaw and Strong (1998) tried to explain the System Use construct with a model with a mediator construct, Intention to Use, and the independent constructs related with the Task-Technology Fit: Intrinsic Fit, Contextual Fit, Representation Fit and Accessibility Fit; and with the Behavioural Control construct. They could explain 16 per cent of the variance of the System Use construct and 70 per cent of the Intention to Use construct.

Burton-Jones and Straub (2006) re-conceptualize the system usage construct in specific nomological circumstances, working in two phases, definition and selection. This scheme permits researchers to establish precise measures of system usage for a particular context. The first phase necessitates a definition of the system use and determines basic assumptions. In the selection phase, the system usage needs to be designed according to its structure and function.

To explain in a better way the System Use construct (duration, frequency, and intensity), Venkatesh *et al.* (2008), use a mediator construct, Behavioural Expectations, and two independent constructs, Behavioural Intentions and Facilitating Conditions, in a longitudinal field study, and explained between 60 per cent and 65 per cent of the variance of the dependent construct, System Use.

Continuing research to further specify the System Use Construct, Lallmahomed *et al.* (2013) utilised a model with the mediator construct Behavioural Intention, the independent constructs Performance Expectancy, Effort Expectancy, Social Influence, Facilitating

Conditions and Hedonic Performance Expectancy, and System Use as dependent construct (Cognitive Absorption; volume, frequency and intensity; and Deep Structure Use), and achieved a variance explanation of 71 per cent of the dependent construct.

As could be observed in the previous lines, there are contradictory results of the relation of the System Use construct (System Dependence construct) with the Perceived Usefulness construct (Individual Impact construct), and other constructs as User Satisfaction. It is not completely clear too when specifying the voluntary or mandatory context, if the System Use construct has a direct and significant relationship with other constructs. Furthermore, some authors as [Venkatesh et al. \(2008\)](#) and [Lallmahomed et al. \(2013\)](#) has tried new conceptualisation of this construct, working with predictors of use, and have obtained good explanations of the System Use construct (between 60 and 65 and 71 per cent of the variance explained).

7. Discussion

The results received from this research indicates that the Seddon model performs and explains better what is happening with the BIS, compared to the DeLone and McLean model and with the Modified Seddon model. The fit is better than in the DeLone and McLean model (CFI of 0.958 vs 0.948; RMSEA 0.068 vs 0.076), the same goes for R^2 Average explained (0.537 vs 0.522). The Seddon model has a significant relationship between the System Dependence (System Use) and the other constructs, whereas the DeLone and McLean do not. The Seddon model has five significant relations between the constructs, while the DeLone and McLean has only three. The Modified Seddon model obtains an almost as good result, as the Seddon model, with the only advantage that explains one additional significant relation between constructs (six in total).

In the last years, the DeLone and McLean model, which is one of the more used models to estimate the impact of an IS, has been evaluated through several studies that have used it partially or completely. Most of the relations between constructs have been confirmed ([Petter et al., 2008](#)). The construct System Use, as previously mentioned, could be a good indicator of a successful system when it is voluntary or discretionary, and not when the system has captive users, who do not have an alternative system to process information ([Lucas, 1978](#)). Besides that, [Petter and McLean \(2009\)](#) performed a meta-analysis on the DeLone and McLean Success of IS model, considering 52 studies. They concluded that the User construct needed to be improved. Given that there no more consistent or confident measures exist, it would be difficult to find relations between this construct and the others of the model.

[Wieder et al. \(2012\)](#) performed research about the impact of BI tools on Performance working with the DeLone and McLean model of IS Success. They did not find a significant relation between User Satisfaction and BI Use but found a weak relation between BI Use and Performance Indicators. They indicated that it is possible to find several particularities in BISs: first, the most advanced users of the system use the system more, in its full capacity, find errors, create difficult questions about the system, become less satisfied with the system and possibly use it less. On the other hand, the less experimented users look for the simple ways of using the system, find everything they need, are happy with the system, and would use it more.

Second, the BIS are configured to elaborate reports for easy usage in a fully-automated way. Users who want to get the most from the system need to have advanced technical skills and need to know a little more about the basic configuration of the system. This is related to the frustration of the user, indicating a lack of friendliness and adequate technical characteristics of the system. Finally, there would be an inadequate System Use because of a

shortage of mental and cultural awareness of BI, and the BIS would lack performance. Because of those reasons, the construction of the System Dependence (System Use), according to [Rai et al., 2002](#), is not working well in the DeLone and McLean model, it does not get a good fit, nor does it have a good level of explanation.

The Modified Seddon model considers an additional restriction compared with the Seddon model. It indicates that there is a correlation between the Perceived Usefulness (Individual Impact) and the System Dependence (System Use) constructs. In this way, a better explanation and fit will exist. The supposition here is that the users of the Information System only have one viable choice for getting and analysing information, increasing the perceived benefit of the Perceived Usefulness (Individual Impact), so there is a correlation between Perceived Usefulness (Individual Impact) and System Dependence (System Use), with no causal relation between them.

The System Use (System Dependence) construct seems to work well in this research, using the Seddon IS Success model, nevertheless that variance explanation is not so high (12.2 per cent), and showing no relation with the Individual Impact (Perceived Usefulness) (observed when applying the modified Seddon IS Success model). Therefore, it could be interesting to make future research comparing these three models but working with a modified System Use (System Dependence) construct, considering the predictors of use, as proposed by [Venkatesh et al. \(2008\)](#) and [Lallmahomed et al. \(2013\)](#). The System Use construct could be mediated by a Behavioural Intention construct that works with the next independent constructs: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. The System Use construct would have the next variables or components: User aspect (cognitive absorption), System Aspect (volume, frequency, intensity), and Task aspect (deep structure use).

As a way of attesting the practical and theoretical implications, and insinuate some conclusions, we can say that the Seddon model seems to explain better what happens with a BIS and will be preferable to use this model when making a research, nevertheless that it would be relevant to repeat this analysis to confirm the results. In the case of the Use Construct (System Dependence), it seems necessary when using it as a part of an Information System Success model, like the DeLone and McLean model or Seddon model, that it has to be established with more detail, considering some complementarities like the mentioned by [Burton-Jones and Straub \(2006\)](#), [Venkatesh et al. \(2008\)](#), or [Lallmahomed et al. \(2013\)](#).

8. Limitations and recommendations for future studies

It is estimated that the sample includes more than 15 per cent of all the companies that use a BISs in Peru, so the size of the sample is adequate, but it is not entirely random and therefore limits the generalizability of outcomes. Besides that, a sample size that is bigger could be better for the sake of making a more detailed analysis, permitting the use of some items with less power, or the use of another statistical procedure for structural equations such as the Asymptotical Distribution Free, permitting a more detailed analysis ([Hair et al., 2006](#)).

As mentioned previously in the Discussion section, it would be interesting to continue the research of this subject, comparing the same three models, but conceptualising the System Use construct considering the predictors of use, to obtain a better explanation (variance) and getting more significant relations with other constructs. Another point would be to try to be more rigorous would be equally better, allowing the utilisation of some objective measures, not only perceptual measures for several of the constructs.

References

- Baroudi, J., Olson, M. and Ives, B. (1986), "An empirical study of the impact of user involvement on system usage and information satisfaction", *Communications of the Acm*, Vol. 29 No. 3, pp. 232-238.
- Bokhari, R.H. (2005), "The relationship between system usage and user satisfaction: a Meta-analysis", *Journal of Enterprise Information Management*, Vol. 18 No. 2, pp. 211-234.
- Brown, I. and Jayakody, R. (2009), "Business e-commerce success: a test validation of a revised conceptual model", *The Electronic Journal Information Systems Evaluation*, Vol. 12 No. 2, pp. 129-148.
- Burton-Jones, A. and Straub, D.W. (2006), "Reconceptualising system use: an approach and empirical test", *Information Systems Research*, Vol. 17 No. 3, pp. 228-246.
- Byrne, B.M. (2006), *Structural Equation Modeling with EQS*, Psychology Press, New York, NY.
- Chen, H., Chiang, R. and Storey, V. (2012), "Business intelligence and analytics: from big data to big impact", *MIS Quarterly*, Vol. 36 No. 4, pp. 1165-1188.
- Chen, L., Soliman, K.S., Mao, E. and Frolick, M.N. (2000), "Measuring user satisfaction with data warehouses: an exploratory study", *Information and Management*, Vol. 37 No. 3, pp. 103-110.
- Chugh, R. and Grandhi, S. (2013), "Why business intelligence? Significance of business intelligence tools and integrating BI governance with corporate governance", *International Journal of Entrepreneurship and Innovation*, Vol. 4 No. 2, pp. 1-14, available at: www.researchgate.net/publication/273861123_Why_Business_Intelligence_Sign
- D'Ambra, J. and Rice, R.E. (2000), "Emerging factors in user evaluating of the world wide web", *Information and Management*, Vol. 1904, pp. 1-12, available at: www.elsevier.com/locate/dsw
- DeLone, W.H. and McLean, E.R. (1992), "Information systems success: the quest for the dependent variable", *Information Systems Research*, Vol. 3 No. 1, pp. 60-95.
- DeLone, W.H. and McLean, E.R. (2003), "The DeLone and McLean model of information systems success: a ten-year update", *Journal of Management Information Systems*, Vol. 19 No. 4, pp. 9-30.
- Dishaw, M.T. and Strong, D.M. (1998), "Assessing the software maintenance tool utilization using task-technology fit and fitness-for-use models", *Software Maintenance: Research and Practice*, Vol. 10 No. 3, pp. 151-179.
- Eom, S., Ashill, N.J., Arbaugh, J.B. and Stapleton, J.L. (2012), "The role of information technology in e-learning system success", *Human Systems Management*, Vol. 31 No. 3/4, pp. 147-163.
- Gartner (2013), "Gartner executive program survey of more than 2,000 CIOs shows digital technologies are top priorities in 2013", available at: www.gartner.com/newsroom/id/2304615 (accessed 7 June 2016).
- Gelderman, M. (1998), "The relationship between user satisfaction, usage of information systems and performance", *Information and Management*, Vol. 34 No. 1, pp. 11-18.
- Gonzales, R. (2008), *Modelos Para Medir el Impacto de Los Sistemas de Información*, Unpublished manuscript, ESAN University.
- Goodhue, D.L. and Thompson, R.L. (1995), "Task-technology fit and individual performance", *MIS Quarterly*, Vol. 19 No. 2, pp. 213-236.
- Guimaraes, T. and Igarria, M. (1997), "Client/server system success: exploring the human side", *Decision Sciences*, Vol. 28 No. 4, pp. 851-876.
- Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2006), *Multivariate Data Analysis*, Pearson Prentice Hall, Upper Saddle River.
- Halawi, L.A., McCarthy, R.V. and Aronson, J.E. (2007-2008), "An empirical investigation of knowledge management systems' success", *Journal of Computer Information Systems*, Vol. 48 No. 3, pp. 121-135.
- Hartwick, J. and Barki, H. (1994), "Explaining the role of user participation in information system use", *Management Science*, Vol. 40 No. 4, pp. 440-465.

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- He, J. and King, W.R. (2008), "The role of user participation in information systems development: implications for a Meta-analysis", *Journal of Management Information Systems*, Vol. 25 No. 1, pp. 301-331.
- Hennington, A., Janz, B., Amis, J. and Nichols, E. (2009), "Information systems and healthcare xxxii: understanding the multidimensionality of information systems use: a study of nurses' use of mandated electronic medical record system", *Communications of the Association for Information Systems*, Vol. 25 No. 25, pp. 243-262.
- Hong, S., Katerattanakul, P., Hong, S. and Cao, Q. (2006), "Usage and perceived impact of data warehouses: a study in Korean financial companies", *International Journal of Information Technology and Decision Making*, Vol. 5 No. 2, pp. 297-315.
- Iivari, J. (2005), "An empirical test of the DeLone-McLean model of information system success", *ACM SIGMIS Database*, Vol. 36 No. 2, pp. 8-27.
- Kulkarny, U., Ravindran, S. and Freeze, R. (2006), "Knowledge management success model: theoretical development and empirical validation", *Journal of Management Information Systems*, Vol. 23 No. 3, pp. 309-347.
- Lallmahomed, M.Z.I., Rahim, N.Z.A., Ibrahim, R. and Rahman, A.A. (2013), "Predicting different conceptualizations of system use: acceptance in hedonic volitional context (facebook)", *Computers in Human Behavior*, Vol. 29 No. 6, pp. 2776-2787.
- Lucas, H.C. (1978), "Empirical evidence for a descriptive model of implementation", *MIS Quarterly*, Vol. 2 No. 2, pp. 27-42.
- Lucas, H.C. and Spitler, V.K. (1999), "Technology and performance: a field study of broker workstations", *Decision Sciences*, Vol. 30 No. 2, pp. 291-311.
- McKinney, V., Yoon, K. and Zahedi, F. (2002), "The measure of web-customer satisfaction: an expectation and disconfirmation approach", *Information Systems Research*, Vol. 13 No. 3, pp. 296-315.
- Norzaidi, M.D., Salwani, M.I., Chong, S.C. and Rafidah, K. (2008), "A study of intranet usage and resistance in Malaysia's port industry", *Journal of Computer Information Systems*, Vol. 49 No. 1, pp. 37-47.
- Parzinger, M.J. and Frolick, M.N. (2001), "Creating competitive advantage through data warehousing", *Information Strategy: The Executive's Journal*, Vol. 17 No. 4, pp. 10-15.
- Petter, S., DeLone, W. and McLean, E. (2008), "Measuring information systems success: models, dimensions, measure, and interrelationships", *European Journal of Information Systems*, Vol. 17 No. 3, pp. 236-263.
- Petter, S. and McLean, E.R. (2009), "A Meta-analytic assessment of the DeLone and McLean IS success model: an examination of IS success at the individual level", *Information and Management*, Vol. 46 No. 3, pp. 159-166.
- Rai, A., Lang, S.S. and Walker, R.B. (2002), "Assessing the validity of IS success models: an empirical test and theoretical analysis", *Information Systems Research*, Vol. 13 No. 1, pp. 50-69.
- Roldan, J.L. and Millan, A.L. (2000), "Analysis of the information systems success dimensions interdependence: an adaptation of the DeLone and McLean's model of the spanish EIS field", *BITWorld 2000, Conference Proceedings*.
- Sabherwal, R., Jeyaraj, A. and Chowa, C. (2006), "Information system success: individual and organizational determinants", *Management Science*, Vol. 52 No. 12, pp. 1849-1864.
- Seddon, P.B. (1997), "A respecification and extension of the DeLone and McLean model of IS success", *Information Systems Research*, Vol. 8 No. 3, pp. 240-253.
- Sharda, R., Delen, D. and Turban, E. (2014), *Business Intelligence, a Managerial Perspective*, Pearson, Boston.
- Soh, C. and Markus, M.L. (1995), "How it creates business value: a process theory synthesis", *Proceedings of the 16th International Conference of Information Systems, Amsterdam, The Netherlands*.

- Swanson, B.E. (1974), "Management information systems: appreciation and involvement", *Management Science*, Vol. 21 No. 2, pp. 178-188.
- Venkatesh, V., Brown, S.A., Maruping, L.M. and Bala, H. (2008), "Predicting different conceptualizations of system use: the competing roles of behavioral intention, facilitating conditions, and behavioral expectation", *MIS Quarterly*, Vol. 32 No. 3, pp. 483-502.
- Wieder, B., Ossimitz, M.-L. and Chamoni, P. (2012), "The impact of business intelligence tools on performance: a user satisfaction paradox?", *International Journal of Economic Sciences and Applied Research*, Vol. 5 No. 3, pp. 7-32.
- Yuthas, K. and Young, S.T. (1998), "Materials matters: assessing the effectiveness of materials management IS", *Information and Management*, Vol. 33 No. 3, pp. 115-124.

	Authors	Description/Objective of the Study	Type of Study	Measures	Research Strategy
1	Iivari (2005)	Test the IS Success of Delone and McLean in the adoption of a new IS	Quantitative	System quality, Information quality, Actual use, User Satisfaction and Individual Impact	Sample through questionnaire
2	Rai, Lang & Welker (2002)	Assess the validity of IS models	Quantitative	Ease of Use, Information Quality, System Dependence, User Satisfaction & Perceived Usefulness	Sample through questionnaire
3	Lee, Hong & Katerattanakul (2004)	Impact of DW in the performance of retail companies	Quantitative	Financial performance: improvement in Sales by employee, ROS, growth of Sales Not financial performance: promotional performance by customer, seller, and marketing segmentation	Sample through questionnaire
4	Hong, Katerattanakul, Hong & Cao (2006)	Use and perceptual impact of the DW in financial companies in Korea	Quantitative	Individual Impact, Use of the System, Perceived Ease of Use, Perceived Use, Data Quality, Reply time accessibility, Support <i>t</i> and training	Sample through questionnaire
5	Park (2006)	Effect of DW as support for performance improvement with the use of DSS	Quantitative	Effect in decision process (precision) and income maximization	Laboratory experiment
6	Wixom & Watson (2001)	Success factors in the implementation of a DW	Quantitative	Perceived net benefits, Data quality, System quality, administrative support, user's involvement, development techn.	Field study Primary data
7	Nelson, Todd & Wixom (2005)	Antecedents of the quality in the DW (System quality and Information quality)	Quantitative	System quality and Information quality	Field study Primary data
8	Shin (2003)	Success Factors of the DW	Quantitative & Qualitative	Data quality, ability to locate data, access authorisation, ease of use, user training, system performance & information utility	Sample through questionnaire
9	Brown & Jayakody (2009)	IS Success model applied to B2C e-Commerce	Quantitative	Continuance Intention, User Satisfaction, Perceived Usefulness, Service quality, System quality, Information quality, and Trust	Sample through questionnaire
10	Chen, Soliman, Mao, & Frolick (2000)	Satisfaction in DW Exploratory study	Quantitative Exploratory	21 items related with the satisfaction of the use of a DW	Sample through questionnaire

Notes: Elaborated by Gonzales (2008) and the authors. Significance (*p*-values): * (<0.05), ** (<0.01), *** (<0.001)

(continued)

Table AI.

Category	Theoretical Model	Explanation of Constructs/ R^2	Significant relations
1 Benefits	DeLone & McLean (1992)	Individual Impact = 0.35 Actual Use = 0.18 User Satisfaction = 0.58	User Satisfaction – Individual Impact** Actual Use - Individual Impact - No Actual Use - User Satisfaction - No System dependence- Usefulness** User satisfaction- Usefulness** User satisfaction- System dependence** Promotional Effects* Vendor Effects* Customer Effects** Market Segmentation Effects* Ease of use Usefulness* Usefulness-System use* System use-Individual Impact*
2 Benefits	DeLone & McLean (1992) & Seddon (1997)	Usefulness = 0.60 System dependence = 0.30 User Satisfaction = 0.51	Two hypothesis related with the advantage of the DW were supported, and three hypothesis rejected
3 Benefits	DeLone & McLean (1992), Pitt, Watson & Kavan (1995) Myers, Kappelman & Prybutok (1998)	Anova analysing impact of DW on organizational outcomes	Data quality, Net benefits* System quality-Net benefits*** System quality-Information Satisfact, ** System quality - System Satisfact***
4 Benefits and outcomes of the system	DeLone & McLean (1992) TAM	Ease of Use = 0.523 Usefulness = 0.637 Individual Impact = 0.699 System Use = 0.342	Data quality-User satisfaction* Ability to locate data-User satisfact, * System throughput- User satisfaction* Usefulness-User Satisfaction* Usefulness-Continuance Intention*** User Satisfaction- Continuance Intention*
5 Benefits and Decisions Laboratory Experiment	DeLone & McLean (1992, 2003) Seddon (1997)	Anova Analysis Dependent variable: decision performance. Independent: Traditional vs DW	End-user satisfaction is related with the support provided by Information centres
6 Benefits	DeLone & McLean (1992)	Net benefits = 0.369 Data quality = 0.016 System quality = 0.128 Information quality = 0.761 System quality = 0.739	
7 Benefits	Seddon (1997) & (1994) DeLone & McLean (1992)	User Satisfaction = 0.70	
8 User Satisfaction	De Lone & McLean (1992, 2003)		
9 Continuance Intention	DeLone & McLean (1992, 2003) Seddon (1997) Seddon & Kiev (1996)		
10 21 items in a five points Likert scale	DeLone & McLean (1992) Bailey & Person (1983) Doll & Torkzadeh (1988)	Factor analysis found 3 factors: Support provided to end-users, Accuracy, Fulfilment of end-user needs	

Variable	Abbreviated Variable	N	N lost	Averg	SD	Variant Coeff	Min	Max
Business Sector	BUSSECT	110	0	2.790	2.279	82%	1	9
Activity user of the system	ACT-USU	109	1	3.991	2.602	65%	1	7
Years of experience	YEARS	86	24	5.372	3.767	70%	1	20
Information quality- Data relevance	IQ-DR	110	0	5.909	1.080	18%	2	7
Information quality- Detail level	IQ-DL	110	0	5.473	1.029	19%	3	7
Information quality- Data accuracy	IQ-DA	110	0	5.273	1.188	23%	2	7
Information quality- Data currently	IQ-DC	110	0	5.582	1.252	22%	1	7
Information quality- Data understanding	IQ-DU	110	0	5.536	1.147	21%	2	7
Information quality- Data completeness	IQ-COM	110	0	5.091	1.138	22%	2	7
System quality- Data retrievalness	SQ-DR	110	0	5.291	1.251	24%	2	7
System quality- System access	SQ-SA	110	0	5.491	1.319	24%	1	7
System quality- Access tools	SQ-AT	110	0	5.264	1.155	22%	2	7
System quality- Waiting time	SQ-WT	110	0	4.873	1.421	29%	1	7
System quality- Flexibility	SQ-F	110	0	4.455	1.542	35%	1	7
Service quality- User training	SEQ-UT	110	0	5.309	1.457	27%	1	7
Service quality- Rapid reply	SEQ-RR	110	0	5.027	1.371	27%	1	7
Service quality- Effective solution	SEQ-ES	110	0	5.145	1.107	22%	1	7
Service quality- Management Encouragement	SEQ-ME	110	0	5.373	1.439	27%	1	7
Service quality- Management support	SEQ-MS	110	0	5.336	1.221	23%	1	7
Use- Common use	USE-C	110	0	5.364	1.276	24%	2	7
Use- Average use	USE-A	110	0	4.936	1.486	30%	2	7
Use- Average time	USE-AT	110	0	4.273	1.670	39%	2	7
User Satisfaction- After using the system	US-AU	110	0	5.191	1.153	22%	2	7
User Satisfaction- After using the system-2	US-AU2	110	0	5.164	1.146	22%	2	7
User Satisfaction- When using the system	US-WU	110	0	5.036	1.234	25%	1	7
User Satisfaction- After using the system	US-AUS	110	0	5.055	1.074	21%	2	7
User Satisfaction- Suggesting the system to other company	US-SOC	110	0	5.091	1.282	25%	1	7
Individual Impact- Swiftness doing my tasks	II-SDT	110	0	5.409	1.069	20%	3	7
Individual Impact- Job performance improvement	II-JPI	110	0	5.482	1.090	20%	3	7
Individual Impact- Productivity improvement	II-PI	110	0	5.382	1.211	23%	2	7
Individual Impact- Decisions upgrade	II-DU	110	0	5.709	1.120	20%	3	7
Individual Impact- Work usefulness	II-WU	110	0	5.700	1.208	21%	2	7

Source: Own elaboration

Table AII.
Descriptive statistics

IQ-DR	IQ-DL	IQ-DA	IQ-DC	IQ-DU	IQ-COM	SO-DR	SO-SA	SO-AT	SO-WT	SO-F	SEQ-UT	SEQ-RR	SEQ-ES	SEQ-ME	SEQ-MS	USE-C	USE-A	USE-AU1	USE-AU2	USE-AU3	USE-AU4	USE-AU5	USE-AU6	USE-AU7	USE-AU8	USE-AU9	USE-AU10	USE-AU11	USE-AU12	USE-AU13	USE-AU14	USE-AU15	USE-AU16	USE-AU17	USE-AU18	USE-AU19	USE-AU20	USE-AU21	USE-AU22	USE-AU23	USE-AU24	USE-AU25	USE-AU26	USE-AU27	USE-AU28	USE-AU29	USE-AU30	USE-AU31	USE-AU32	USE-AU33	USE-AU34	USE-AU35	USE-AU36	USE-AU37	USE-AU38	USE-AU39	USE-AU40	USE-AU41	USE-AU42	USE-AU43	USE-AU44	USE-AU45	USE-AU46	USE-AU47	USE-AU48	USE-AU49	USE-AU50	USE-AU51	USE-AU52	USE-AU53	USE-AU54	USE-AU55	USE-AU56	USE-AU57	USE-AU58	USE-AU59	USE-AU60	USE-AU61	USE-AU62	USE-AU63	USE-AU64	USE-AU65	USE-AU66	USE-AU67	USE-AU68	USE-AU69	USE-AU70	USE-AU71	USE-AU72	USE-AU73	USE-AU74	USE-AU75	USE-AU76	USE-AU77	USE-AU78	USE-AU79	USE-AU80	USE-AU81	USE-AU82	USE-AU83	USE-AU84	USE-AU85	USE-AU86	USE-AU87	USE-AU88	USE-AU89	USE-AU90	USE-AU91	USE-AU92	USE-AU93	USE-AU94	USE-AU95	USE-AU96	USE-AU97	USE-AU98	USE-AU99	USE-AU100	USE-AU101	USE-AU102	USE-AU103	USE-AU104	USE-AU105	USE-AU106	USE-AU107	USE-AU108	USE-AU109	USE-AU110	USE-AU111	USE-AU112	USE-AU113	USE-AU114	USE-AU115	USE-AU116	USE-AU117	USE-AU118	USE-AU119	USE-AU120	USE-AU121	USE-AU122	USE-AU123	USE-AU124	USE-AU125	USE-AU126	USE-AU127	USE-AU128	USE-AU129	USE-AU130	USE-AU131	USE-AU132	USE-AU133	USE-AU134	USE-AU135	USE-AU136	USE-AU137	USE-AU138	USE-AU139	USE-AU140	USE-AU141	USE-AU142	USE-AU143	USE-AU144	USE-AU145	USE-AU146	USE-AU147	USE-AU148	USE-AU149	USE-AU150	USE-AU151	USE-AU152	USE-AU153	USE-AU154	USE-AU155	USE-AU156	USE-AU157	USE-AU158	USE-AU159	USE-AU160	USE-AU161	USE-AU162	USE-AU163	USE-AU164	USE-AU165	USE-AU166	USE-AU167	USE-AU168	USE-AU169	USE-AU170	USE-AU171	USE-AU172	USE-AU173	USE-AU174	USE-AU175	USE-AU176	USE-AU177	USE-AU178	USE-AU179	USE-AU180	USE-AU181	USE-AU182	USE-AU183	USE-AU184	USE-AU185	USE-AU186	USE-AU187	USE-AU188	USE-AU189	USE-AU190	USE-AU191	USE-AU192	USE-AU193	USE-AU194	USE-AU195	USE-AU196	USE-AU197	USE-AU198	USE-AU199	USE-AU200	USE-AU201	USE-AU202	USE-AU203	USE-AU204	USE-AU205	USE-AU206	USE-AU207	USE-AU208	USE-AU209	USE-AU210	USE-AU211	USE-AU212	USE-AU213	USE-AU214	USE-AU215	USE-AU216	USE-AU217	USE-AU218	USE-AU219	USE-AU220	USE-AU221	USE-AU222	USE-AU223	USE-AU224	USE-AU225	USE-AU226	USE-AU227	USE-AU228	USE-AU229	USE-AU230	USE-AU231	USE-AU232	USE-AU233	USE-AU234	USE-AU235	USE-AU236	USE-AU237	USE-AU238	USE-AU239	USE-AU240	USE-AU241	USE-AU242	USE-AU243	USE-AU244	USE-AU245	USE-AU246	USE-AU247	USE-AU248	USE-AU249	USE-AU250	USE-AU251	USE-AU252	USE-AU253	USE-AU254	USE-AU255	USE-AU256	USE-AU257	USE-AU258	USE-AU259	USE-AU260	USE-AU261	USE-AU262	USE-AU263	USE-AU264	USE-AU265	USE-AU266	USE-AU267	USE-AU268	USE-AU269	USE-AU270	USE-AU271	USE-AU272	USE-AU273	USE-AU274	USE-AU275	USE-AU276	USE-AU277	USE-AU278	USE-AU279	USE-AU280	USE-AU281	USE-AU282	USE-AU283	USE-AU284	USE-AU285	USE-AU286	USE-AU287	USE-AU288	USE-AU289	USE-AU290	USE-AU291	USE-AU292	USE-AU293	USE-AU294	USE-AU295	USE-AU296	USE-AU297	USE-AU298	USE-AU299	USE-AU300	USE-AU301	USE-AU302	USE-AU303	USE-AU304	USE-AU305	USE-AU306	USE-AU307	USE-AU308	USE-AU309	USE-AU310	USE-AU311	USE-AU312	USE-AU313	USE-AU314	USE-AU315	USE-AU316	USE-AU317	USE-AU318	USE-AU319	USE-AU320	USE-AU321	USE-AU322	USE-AU323	USE-AU324	USE-AU325	USE-AU326	USE-AU327	USE-AU328	USE-AU329	USE-AU330	USE-AU331	USE-AU332	USE-AU333	USE-AU334	USE-AU335	USE-AU336	USE-AU337	USE-AU338	USE-AU339	USE-AU340	USE-AU341	USE-AU342	USE-AU343	USE-AU344	USE-AU345	USE-AU346	USE-AU347	USE-AU348	USE-AU349	USE-AU350	USE-AU351	USE-AU352	USE-AU353	USE-AU354	USE-AU355	USE-AU356	USE-AU357	USE-AU358	USE-AU359	USE-AU360	USE-AU361	USE-AU362	USE-AU363	USE-AU364	USE-AU365	USE-AU366	USE-AU367	USE-AU368	USE-AU369	USE-AU370	USE-AU371	USE-AU372	USE-AU373	USE-AU374	USE-AU375	USE-AU376	USE-AU377	USE-AU378	USE-AU379	USE-AU380	USE-AU381	USE-AU382	USE-AU383	USE-AU384	USE-AU385	USE-AU386	USE-AU387	USE-AU388	USE-AU389	USE-AU390	USE-AU391	USE-AU392	USE-AU393	USE-AU394	USE-AU395	USE-AU396	USE-AU397	USE-AU398	USE-AU399	USE-AU400	USE-AU401	USE-AU402	USE-AU403	USE-AU404	USE-AU405	USE-AU406	USE-AU407	USE-AU408	USE-AU409	USE-AU410	USE-AU411	USE-AU412	USE-AU413	USE-AU414	USE-AU415	USE-AU416	USE-AU417	USE-AU418	USE-AU419	USE-AU420	USE-AU421	USE-AU422	USE-AU423	USE-AU424	USE-AU425	USE-AU426	USE-AU427	USE-AU428	USE-AU429	USE-AU430	USE-AU431	USE-AU432	USE-AU433	USE-AU434	USE-AU435	USE-AU436	USE-AU437	USE-AU438	USE-AU439	USE-AU440	USE-AU441	USE-AU442	USE-AU443	USE-AU444	USE-AU445	USE-AU446	USE-AU447	USE-AU448	USE-AU449	USE-AU450	USE-AU451	USE-AU452	USE-AU453	USE-AU454	USE-AU455	USE-AU456	USE-AU457	USE-AU458	USE-AU459	USE-AU460	USE-AU461	USE-AU462	USE-AU463	USE-AU464	USE-AU465	USE-AU466	USE-AU467	USE-AU468	USE-AU469	USE-AU470	USE-AU471	USE-AU472	USE-AU473	USE-AU474	USE-AU475	USE-AU476	USE-AU477	USE-AU478	USE-AU479	USE-AU480	USE-AU481	USE-AU482	USE-AU483	USE-AU484	USE-AU485	USE-AU486	USE-AU487	USE-AU488	USE-AU489	USE-AU490	USE-AU491	USE-AU492	USE-AU493	USE-AU494	USE-AU495	USE-AU496	USE-AU497	USE-AU498	USE-AU499	USE-AU500	USE-AU501	USE-AU502	USE-AU503	USE-AU504	USE-AU505	USE-AU506	USE-AU507	USE-AU508	USE-AU509	USE-AU510	USE-AU511	USE-AU512	USE-AU513	USE-AU514	USE-AU515	USE-AU516	USE-AU517	USE-AU518	USE-AU519	USE-AU520	USE-AU521	USE-AU522	USE-AU523	USE-AU524	USE-AU525	USE-AU526	USE-AU527	USE-AU528	USE-AU529	USE-AU530	USE-AU531	USE-AU532	USE-AU533	USE-AU534	USE-AU535	USE-AU536	USE-AU537	USE-AU538	USE-AU539	USE-AU540	USE-AU541	USE-AU542	USE-AU543	USE-AU544	USE-AU545	USE-AU546	USE-AU547	USE-AU548	USE-AU549	USE-AU550	USE-AU551	USE-AU552	USE-AU553	USE-AU554	USE-AU555	USE-AU556	USE-AU557	USE-AU558	USE-AU559	USE-AU560	USE-AU561	USE-AU562	USE-AU563	USE-AU564	USE-AU565	USE-AU566	USE-AU567	USE-AU568	USE-AU569	USE-AU570	USE-AU571	USE-AU572	USE-AU573	USE-AU574	USE-AU575	USE-AU576	USE-AU577	USE-AU578	USE-AU579	USE-AU580	USE-AU581	USE-AU582	USE-AU583	USE-AU584	USE-AU585	USE-AU586	USE-AU587	USE-AU588	USE-AU589	USE-AU590	USE-AU591	USE-AU592	USE-AU593	USE-AU594	USE-AU595	USE-AU596	USE-AU597	USE-AU598	USE-AU599	USE-AU600	USE-AU601	USE-AU602	USE-AU603	USE-AU604	USE-AU605	USE-AU606	USE-AU607	USE-AU608	USE-AU609	USE-AU610	USE-AU611	USE-AU612	USE-AU613	USE-AU614	USE-AU615	USE-AU616	USE-AU617	USE-AU618	USE-AU619	USE-AU620	USE-AU621	USE-AU622	USE-AU623	USE-AU624	USE-AU625	USE-AU626	USE-AU627	USE-AU628	USE-AU629	USE-AU630	USE-AU631	USE-AU632	USE-AU633	USE-AU634	USE-AU635	USE-AU636	USE-AU637	USE-AU638	USE-AU639	USE-AU640	USE-AU641	USE-AU642	USE-AU643	USE-AU644	USE-AU645	USE-AU646	USE-AU647	USE-AU648	USE-AU649	USE-AU650	USE-AU651	USE-AU652	USE-AU653	USE-AU654	USE-AU655	USE-AU656	USE-AU657	USE-AU658	USE-AU659	USE-AU660	USE-AU661	USE-AU662	USE-AU663	USE-AU664	USE-AU665	USE-AU666	USE-AU667	USE-AU668	USE-AU669	USE-AU670	USE-AU671	USE-AU672	USE-AU673	USE-AU674	USE-AU675	USE-AU676	USE-AU677	USE-AU678	USE-AU679	USE-AU680	USE-AU681	USE-AU682	USE-AU683	USE-AU684	USE-AU685	USE-AU686	USE-AU687	USE-AU688	USE-AU689	USE-AU690	USE-AU691	USE-AU692	USE-AU693	USE-AU694	USE-AU695	USE-AU696	USE-AU697	USE-AU698	USE-AU699	USE-AU700	USE-AU701	USE-AU702	USE-AU703	USE-AU704	USE-AU705	USE-AU706	USE-AU707	USE-AU708	USE-AU709	USE-AU710	USE-AU711	USE-AU712	USE-AU713	USE-AU714	USE-AU715	USE-AU716	USE-AU717	USE-AU718	USE-AU719	USE-AU720	USE-AU721	USE-AU722	USE-AU723	USE-AU724	USE-AU725	USE-AU726	USE-AU727	USE-AU728	USE-AU729	USE-AU730	USE-AU731	USE-AU732	USE-AU733	USE-AU734	USE-AU735	USE-AU736	USE-AU737	USE-AU738	USE-AU739	USE-AU740	USE-AU741	USE-AU742	USE-AU743	USE-AU744	USE-AU745	USE-AU746	USE-AU747	USE-AU748	USE-AU749	USE-AU750	USE-AU751	USE-AU752	USE-AU753	USE-AU754	USE-AU755	USE-AU756	USE-AU757	USE-AU758	USE-AU759	USE-AU760	USE-AU761	USE-AU762	USE-AU763	USE-AU764	USE-AU765	USE-AU766	USE-AU767	USE-AU768	USE-AU769	USE-AU770	USE-AU771	USE-AU772	USE-AU773	USE-AU774	USE-AU775	USE-AU776	USE-AU777	USE-AU778	USE-AU779	USE-AU780	USE-AU781	USE-AU782	USE-AU783	USE-AU784	USE-AU785	USE-AU786	USE-AU787	USE-AU788	USE-AU789	USE-AU790	USE-AU791	USE-AU792	USE-AU793	USE-AU794	USE-AU795	USE-AU796	USE-AU797	USE-AU798	USE-AU799	USE-AU800	USE-AU801	USE-AU802	USE-AU803	USE-AU804	USE-AU805	USE-AU806	USE-AU807	USE-AU808	USE-AU809	USE-AU810	USE-AU811	USE-AU812	USE-AU813	USE-AU814	USE-AU815	USE-AU816	USE-AU817	USE-AU818	USE-AU819	USE-AU820	USE-AU821	USE-AU822	USE-AU823	USE-AU824	USE-AU825	USE-AU826	USE-AU827	USE-AU828	USE-AU829	USE-AU830	USE-AU831	USE-AU832	USE-AU833	USE-AU834	USE-AU835	USE-AU836	USE-AU837	USE-AU838	USE-AU839	USE-AU840	USE-AU841	USE-AU842	USE-AU843	USE-AU844	USE-AU845	USE-AU846	USE-AU847	USE-AU848	USE-AU849	USE-AU850	USE-AU851	USE-AU852	USE-AU853	USE-AU854	USE-AU855	USE-AU856	USE-AU857	USE-AU858	USE-AU859	USE-AU860	USE-AU861	USE-AU862	USE-AU863	USE-AU864	USE-AU865	USE-AU866	USE-AU867	USE-AU868	USE-AU869	USE-AU870	USE-AU871	USE-AU872	USE-AU873	USE-AU874	USE-AU875	USE-AU876	USE-AU877	USE-AU878	USE-AU879	USE-AU880	USE-AU881	USE-AU882	USE-AU883	USE-AU884	USE-AU885	USE-AU886	USE-AU887	USE-AU888	USE-AU889	USE-AU890	USE-AU891	USE-AU892	USE-AU893	USE-AU894	USE-AU895	USE-AU896	USE-AU897	USE-AU898	USE-AU899	USE-AU900	USE-AU901	USE-AU902	USE-AU903	USE-AU904	USE-AU905	USE-AU906	USE-AU907	USE-AU908	USE-AU909	USE-AU910	USE-AU911	USE-AU912	USE-AU913	USE-AU914	USE-AU915	USE-AU916	USE-AU917	USE-AU918	USE-AU919	USE-AU920	USE-AU921	USE-AU922	USE-AU923	USE-AU924	USE-AU925	USE-AU926	USE-AU927	USE-AU928	USE-AU929	USE-AU930	USE-AU931	USE-AU932	USE-AU933	USE-AU934	USE-AU935	USE-AU936	USE-AU937	USE-AU938	USE-AU939	USE-AU940	USE-AU941	USE-AU942	USE-AU943	USE-AU944	USE-AU945	USE-AU946	USE-AU947	USE-AU948	USE-AU949	USE-AU950	USE-AU951	USE-AU952	USE-AU953	USE-AU954	USE-AU955	USE-AU956	USE-AU957	USE-AU958	USE-AU959	USE-AU960	USE-AU961	USE-AU962	USE-AU963	USE-AU964	USE-AU965	USE-AU966	USE-AU967	USE-AU968	USE-AU969	USE-AU970	USE-AU971	USE-AU972	USE-AU973	USE-AU974	USE-AU975	USE-AU976	USE-AU977	USE-AU978	USE-AU979	USE-AU980	USE-AU981	USE-AU982	USE-AU983	USE-AU984	USE-AU985	USE-AU986	USE-AU987	USE-AU988	USE-AU989	USE-AU990	USE-AU991	USE-AU992	USE-AU993	USE-AU994	USE-AU995	USE-AU996	USE-AU997	USE-AU998	USE-AU999	USE-AU1000	USE-AU1001	USE-AU1002	USE-AU1003	USE-AU1004	USE-AU1005	USE-AU1006	USE-AU1007	USE-AU1008	USE-AU1009	USE-AU1010	USE-AU1011	USE-AU1012	USE-AU1013	USE-AU1014	USE-AU1015	USE-AU1016	USE-AU1017	USE-AU1018	USE-AU1019	USE-AU1020	USE-AU1021	USE-AU1022	USE-AU1023	USE-AU1024	USE-AU1025	USE-AU1026	USE-AU1027	USE-AU1028	USE-AU1029	USE-AU1030	USE-AU1031	USE-AU1032	USE-AU1033	USE-AU1034	USE-AU1035	USE-AU1036	USE-AU1037	USE-AU1038	USE-AU1039	USE-AU1040	USE-AU1041	USE-AU1042	USE-AU1043	USE-AU1044	USE-AU1045	USE-AU1046	USE-AU1047	USE-AU1048	USE-AU1049	USE-AU1050	USE-AU1051	USE-AU1052	USE-AU1053	USE-AU1054	USE-AU1055	USE-AU1056	USE-AU1057	USE-AU1058	USE-AU1059	USE-AU1060	USE-AU1061	USE-AU1062	USE-AU1063	USE-AU1064	USE-AU1065	USE-AU1066	USE-AU1067	USE-AU1068	USE-AU1069	USE-AU1070	USE-AU1071	USE-AU1072	USE-AU1073	USE-AU1074	USE-AU1075	USE-AU1076	USE-AU1077	USE-AU1078	USE-AU1079	USE-AU1080	USE-AU1081	USE-AU1082	USE-AU1083	USE-AU1084	USE-AU1085	USE-AU1086	USE-AU1087	USE-AU1088	USE-AU1089	USE-AU1090	USE-AU1091	USE-AU1092	USE-AU1093	USE-AU1094	USE-AU1095	USE-AU1096	USE-AU1097	USE-AU1098	USE-AU1099	USE-AU1100	USE-AU1101	USE-AU1102	USE-AU1103	USE-AU1104	USE-AU1105	USE-AU1106	USE-AU1107	USE-AU1108	USE-AU1109	USE-AU1110	USE-AU1111	USE-AU1112	USE
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Source: Own elaboration

Variable (item)	Average	SD	N	D	Aprox. P-Value
IQ-DR	5.90	1.079	110	0.061	>0.15
IQ-DL	5.47	1.029	110	0.032	>0.15
IQ-DA	5.27	1.187	110	0.034	>0.15
IQ-DC	5.58	1.251	110	0.063	>0.15
IQ-DU	5.53	1.146	110	0.052	>0.15
IQ-COM	5.09	1.137	110	0.033	>0.15
SQ-DR	5.29	1.251	110	0.055	>0.15
SQ-SA	5.49	1.318	110	0.059	>0.15
SQ-AT	5.26	1.154	110	0.034	>0.15
SQ-WT	4.87	1.421	110	0.054	>0.15
SQ-F	4.45	1.542	110	0.047	>0.15
SEQ-UT	5.30	1.457	110	0.060	>0.15
SEQ-RR	5.02	1.371	110	0.060	>0.15
SEQ-ES	5.14	1.107	110	0.052	>0.15
SEQ-ME	5.37	1.439	110	0.064	>0.15
SEQ-MS	5.33	1.221	110	0.060	>0.15
USE-C	5.36	1.275	110	0.050	>0.15
USE-A	4.93	1.485	110	0.040	>0.15
USE-AT	4.27	1.669	110	0.059	>0.15
US-AU	5.19	1.153	110	0.039	>0.15
US-AU2	5.16	1.145	110	0.031	>0.15
US-WU	5.03	1.233	110	0.038	>0.15
US-AUS	5.05	1.073	110	0.024	>0.15
US-SOC	5.09	1.281	110	0.049	>0.15
II-SDT	5.40	1.069	110	0.037	>0.15
II-JPI	5.48	1.089	110	0.046	>0.15
II-PI	5.38	1.211	110	0.054	>0.15
II-DU	5.70	1.119	110	0.057	>0.15
II-WU	5.70	1.208	110	0.066	>0.15

Source: Own elaboration

Table AIII.
Kolmogorov-smirnov
normality TEST

Appendix 5

Table AIV.
Confirmatory factor
analysis

Construct	Variables	Construct	Variables
Information quality	IQDA	USE (system dependence)	USEC
System quality	IQDC	User satisfaction	USEA
	IQCOM		USEAT
	SQDR		USAU
	SQSA		USAU2
	SQAT		USWU
Service quality	SEQRR	Individual impact (Perceived usefulness)	USAUS
	SEQES		IISDT
	SEQME		IJIPI
	SEQMS		IIPi
Eliminated observations (6): 34, 39, 47, 56, 76, 107			
Multivariate kurtosis: 2.86			
<u>Maximum likelihood</u>		<u>Robust</u>	
Chi-square	290	CHI-SQUARE	281
CFI	0.956	CFI	0.946
RMSEA	0.070	RMSEA	0.067
<u>Ave by construct</u>		<u>Construct reliability</u>	
IQ	39.99%	IQ	0.66
SQ	54.41%	SQ	0.78
SEQ	53.36%	SEQ	0.82
UES	51.97%	UES	0.75
US	70.74%	US	0.91
II	61.86%	II	0.89
<u>Reliability coefficients</u>			
Cronbach's alpha		0.954	
Reliability coefficient RHO		0.974	
Source: Own elaboration			

(Significance and Variance Extracted (R^2))	Rai <i>et al.</i>	This study
<i>DeLone & McLean model</i>		
Easy of use-System dependence	*	—
Easy of use-User Satisfaction	**	—
Information Quality-System dependence	**	—
Information Quality-User Satisfaction	**	*
User Satisfaction-System dependence	**	—
System dependence-Perceived Usefulness	**	—
User Satisfaction-Perceived Usefulness	**	*
R^2		
System Dependence	30%	12%
User Satisfaction	51%	77%
Perceived Usefulness	60%	65%
<i>Seddon model</i>		
Easy of use-Perceived usefulness	**	*
Easy of use-User Satisfaction	**	—
Information quality-Perceived Usefulness	**	—
Information quality-User Satisfaction	**	*
User Satisfaction-Perceived Usefulness	**	*
User Satisfaction-System dependence	**	*
R^2		
Perceived Usefulness	41%	69%
User Satisfaction	55%	80%
System Dependence	27%	12%
<i>Modified Seddon model</i>		
Easy of use-Perceived usefulness	**	*
Easy of use-User Satisfaction	**	—
Information quality-Perceived Usefulness	**	*
Information quality-User Satisfaction	**	*
User Satisfaction-Perceived Usefulness	**	*
User Satisfaction-System dependence	**	*
Perceived Usefulness-System dependence	**	—

Table AV.
Comparison with the
study of rai, Lang
and Welker (2002)
(continued)

Table AV.

(Significance and Variance Extracted (R^2))		
	Rai <i>et al.</i>	This study
R^2		
Perceived Usefulness	41 %	69 %
User Satisfaction	55 %	80 %
System Dependence	53 %	12 %
<i>Main characteristics of the study</i>		
Structural equations	Lisrel	EQS
Year of the study	2002	2014
Unit of analysis	University students of one university	Executives of IT department of thirteen companies
Information System	Computarized student information System	BIS
Note: Significance (p values): * (<0.05), ** (<0.01)		
Source: Own elaboration		

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