Information Technology Determinants of Organizational Performance in the Context of a Cameroonian Electricity Company

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Abstract. Increased organizational dependence on information technology (IT) drives management attention towards improving information system quality. Given that IT quality is a multidimensional measure, it is important to determine which of its aspects are critical to organization's performance so that chief information officers (CIOs) may make more informed choices when selecting technologies for their organizations. This research investigates the relationship between system quality (SQ) and organizational performance, system quality and system use, user satisfaction system use and organizational performance, and finally, user satisfaction and organizational performance. A total of 140 responses were collected through a questionnaire-based survey with an electrical company, and the data were analyzed using the structural equation modelling partial least square (SEM-PLS) method. Our results show that system quality influences user satisfaction significantly, which in turn influences organizational performance. Thus, this paper highlights the importance of user satisfaction in organizational performance.

Keywords: System quality · System use · User satisfaction
Organizational performance

1 Introduction

Organizations continue to increase spending on information technology (IT) and their budgets continue to rise even in the face of potential downturns [1]. This is a reality in all companies, including those based in Cameroon. Naturally, organizations are interested in knowing the return on these investments. The value of IT is often indirect and influenced by human, organizational, and environmental factors, rendering its measurement both complex and illusive [2]. Nevertheless, the business value of these investments must be measured to determine if they are worth the risk. An effective way of determining the value of IT is by measuring its impact on organizational performance.

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To increase organizational performance, most information systems (IS) nowadays are computerized to facilitate and automate business activities. Despite financial difficulties including a low level of electricity supply nationwide, the country is going through. Cameroon's national electricity company, ENEO, is still investing huge amounts in IT. One of the company's main IT systems is its Customer Management System (CMS). This system is used to register new customers, provide customer services, manage user electricity consumption, customer billing and payments, and customer management control.

Given that CMS is the main system used by ENEO to manage its daily business operations, this paper seeks to investigate the factors surrounding this system that could influence organizational performance. To achieve this research objective, the study makes use of constructs from the Delone and Mc Lean IS success model [3], as they were identified to be the most suited for this context of study where managers are involved in all decision-related information from the information system.

2 Research Model and Hypotheses

System quality (SQ): It refers to the technical qualities of the system and its use. According to DeLone and McLean [3], system quality influences jointly and positively the use of the system and user satisfaction. More specifically, the quality of the system directly affects system use and user satisfaction, and indirectly affects individual impacts and organizational performance [4].

A well-designed, developed and implemented system is a necessary prerequisite to deriving organizational benefits [5]. Then, system quality is very important. In our study, CMS is the main system that the organization uses. Users are very regarding about the consistency of user interface, ease of use, quality of documentation, and sometimes, quality and maintainability of program. Based on from this argument, we can summarize our hypotheses as follows:

H1a: SQ has a significant positive effect on the use of the system.
H1b: The effect of SQ on use will be moderated by age, gender and the socio-professional category.
H2a: SQ has a significant positive effect on user satisfaction.
H2b: The effect of SQ on user satisfaction will be moderated by age, gender and the socioprofessional category.
H3: SQ has a direct significant positive effect on organizational performance (Fig. 1).

Use of the system (U): It is the degree and manner in which staff and customers utilize the capabilities of an information system. For example, we can consider these aspects: amount of use, frequency of use, nature of use, appropriateness of use, extent of use, and purpose of use [2]. According to Petter and McLean [2], the use of system, through its quality and its specification, directly affects the organizational performance of the company. Thus, we posit:

H4: The use of system has a significant positive effect on organizational performance

User satisfaction (US) or user information satisfaction is a perceptual or subjective measure of system success. It serves as a substitute for objective determinants of information system effectiveness which are frequently not available [6]. Cyert and March [7], cited by [6], suggest that an information system which meets the needs of its user will reinforce satisfaction with that system. Also, if the system does not provide the needed information, the user will be dissatisfied and will therefore look elsewhere. Thus, user satisfaction can easily be joined to organizational performance. Therefore, we posit:

H5: US has a significant positive effect on organizational performance.

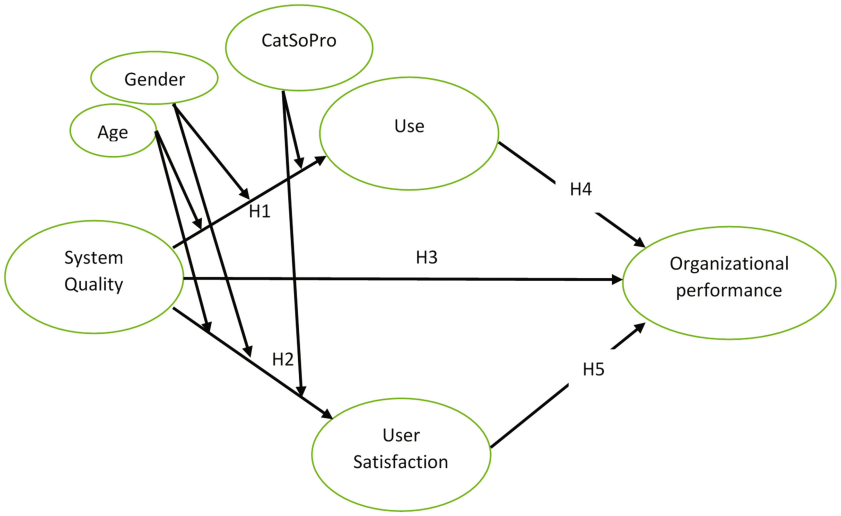

Fig. 1. Research model.

3 Methodology

In this study, we use a quantitative approach. It is based on the quantitative research instruments that are used to collect the data. It results in numerical data that are used to make descriptive analyses, build tables and graphs and carry out a statistical analysis of links between variables or factors, as well as any correlation or association analysis. This allowed us to gather observable data to test the assumptions of our theoretical model.

Electronic questionnaires were edited using the Google form tool to collect data. All items were measured on a Likert scale with seven levels [8], ranging from level 1 ("completely disagree") to level 7 ("strongly agree"). Our target consisted of employees

who use the CMS application in the execution of their daily task. For this sample to be meaningful, we relied on the work of [9], which recommends that for the SEM-PLS method, the minimum sample size must be the multiple of ten (10) for the number of items in the study model variable that includes a maximum of items.

We distributed a total of 375 questionnaires over a period of three months. Out of this number, 140 usable questionnaires were returned, giving a response rate of about 37%. The data collected were analyzed using the XLSTAT software, version 2014.5.03.

4 Results and Discussions

According to the demographic profile of our 140 respondents, Table 1 provides some descriptive statistics.

Table 1. Descriptive statistics of research sample.

Gender	Male		Female		
	70%		30%		
Work experience	<1 year	1–3 years	4–6 years	6–9 years	>10 years
	32%	41%	14%	9%	4%
Age	18–25 years	26–35 years	36–45 years	46–60 years	
	30%	30%	25%	15%	

Table 2 presents the number of items, mean, standard deviations (SD), Cronbach's alpha, composite reliability (CR) and average variance extracted (AVE) of each construct of the overall model. Almost all reported values (Cronbach's alpha, CR, AVE) in the table meet the acceptable threshold values—respectively 0.7, 0.7 and 0.5 [10]. The Cronbach's alpha value of the construct U is 0.6971, which is also acceptable for our study based on Malhotra [11] works. These figures justify which we used all our constructs, and make our measurement model acceptable.

Table 2. Numbers of items, mean, SD, Cronbach's alpha, Rho DG and AVE

Latent variable	Numbers of items	Mean	SD	Cronbach's alpha	Rho de DG	AVE
System quality	3	4.85	1.4660	0.8410	0.9047	0.7593
Use	2	5.7	1.30635	0.6971	0.8600	0.7673
User satisfaction	3	5.13	1.0041	0.7203	0.8435	0.6418
Organizational performance	4	5.03	1.1557	0.8446	0.8959	0.6753

Fornell and Larcker [12] recommend some verification for establishing convergent validity: all indicator factor loadings should be significant and exceed 0.70 so that over one half of the variance is captured by the latent construct [13, 14]; the construct reliabilities should exceed 0.70; and the average variance extracted (AVE) have to be higher than 0.50. As shown in Table 3, factor loadings for all 12 items (belonging to four latent constructs) are greater than 0.7567; only one item had a loading of 0.6938, which was also deemed acceptable as it is well above 0.60 [15]. Furthermore, all AVEs exceeded 0.50 (the minimum AVE was 0.61).

Table 3. Measurement of constructs.

Latent variables	Manifest variables	Loadings
SQ	SQ1	0.9015
	SQ2	0.8813
	SQ3	0.8296
U	U1	0.8857
	U2	0.8661
US	US1	0.8157
	US2	0.8291
	US3	0.7567
OP	OP1	0.8798
	OP2	0.8171
	OP3	0.8821
	OP4	0.6938

Thus, the convergent validity was established. In order to test the discriminant validity of hypothesized scales, [13, 16] recommend two criteria: (i) the square root of AVE for a construct should be larger than their corresponding inter-construct correlation coefficients; and (ii) the within-construct item loadings should exceed the inter-construct cross loadings by at least 0.10. From the inter-factor correlations in Table 4, we can see that the AVEs range from 0.6418 to 0.7673, and each AVE is much larger than the corresponding squared inter-construct correlations. Table 4 presents the discriminant validity of the measurements. According to [17], about discriminant validity, the square root of the construct AVE (average variance extracted) must be higher than the correlation coefficients in the column. The results indicated that our AVE constructs satisfied this condition. Thus, the result provides evidence that all of the constructs used in the study are distinct.

Table 4. Discriminant validity: AVEs vs. squared correlations.

	SQ	U	US	OP	AVE
SQ	**0.8714**				0.7593
U	0.0157	**0.8760**			0.7673
US	0.0645	0.3229	**0.8011**		0.6418
OP	0.0355	0.0337	0.7193	**0.8218**	0.6753

There are strong relationships between the following: SQ and US; and US and OP. SQ and U on the organizational performance OP do not have a significant effect. Similarly, SQ does not have a significant influence on U.

SQ has a positive influence on US and this confirms hypothesis H2 (T = 11.3752, p = 0.0000). Also, the strong relationship between US and OP confirms hypothesis H5 (T = 11.5285, p = 0.0000). SQ and U do not have any significant effect on the organizational performance OP. Also SQ as it does not have a significant on U. Therefore, the hypotheses H1 (T = 1.0996, p = 0.4232), H3 (T = 0.7373, p = 0.0448) and H4 (T = 0.0575, p = 0.0340) are rejected.

In this study, we have three moderating variables: age, which is the age of the different system's users; gender; and the socio-professional category. To measure the value of our moderating factors, we created three other values for those variables, that is, SQxAge, SQxGender, and SQxCatSoPro. Table 6 shows the impact of those three variables in the relationship between SQ and U, and between SQ and SU. So we have UxAge (T = −0.1171, p = 0.9070), UxGender (T = 0.4583, p = 0.6475) and UxCatSoPro (T = −0.0819, p = 0.9349). All those values indicated that all our three moderative variables are not significant for this relation, and therefore for this study. Also, we have USxAge (T = 1.4435, p = 0.1512), USxGender (T = 1.4435, p = 0.1512) and USxCatSoPro (T = −0.7471, p = 0.4563), which is evidence that all our three moderating variables are not significant for both this relation and for this study. As a result, the hypotheses H1b and H2b are rejected.

Table 5. Results of the structural model

Hypothesis		Path coefficient	t-value	p-value	Conclusion
H1a	SQ → U	0.4232	1.0996	0.2735	Rejected
H2a	SQ → US	0.6956	11.3752	0.0000	Accepted
H3	SQ → OP	0.0448	0.7373	0.4622	Rejected
H4	U → OP	0.0340	0.0575	0.5915	Rejected
H5	US → OP	0.8070	11.5282	0.0000	Accepted

Table 6. Representation of moderating variables

Latent variable	T (observed value)	P-value
Age	0.3622	0.7178
Gender	−0.3340	0.7389
CatSoPro	0.1654	0.8688
UxAge	−0.1171	0.9070
UxGender	0.4583	0.6475
UxCatSoPro	−0.0819	0.9349
USxAge	1.4435	0.1512
USxGender	1.4435	0.1512
USxCatSoPro	−0.7471	0.4563

Table 5 presents the results of hypothesis testing for our specific research model. For a probability p under 0.05 and a student statistic below the 1.96 threshold, a hypothesis is accepted [18].

5 Conclusion, Implications and Future Research

The objective of this paper was to present the factors have a direct influence on organizational performance during business operations using ITs. The system studied was the CMS (Customer Management System) used by ENEO (Cameroon electricity corporation) to manage over one million electricity consumers in Cameroon. To achieve this goal, a theoretical model was developed based on the DeLone and McLean IS success model [3]. We had four constructs for the study: system quality, use of system, user satisfaction and organizational performance. We have posited that (i) system quality influences use of system, user satisfaction and organizational performance, (ii) the system use determines organizational performance, and (iii) user satisfaction determines organizational performance. After analyzing the results, only two hypotheses were accepted: system quality determines user satisfaction, and user satisfaction determines organizational performance. All the other hypotheses were rejected. We also found that no moderating variable had a relevant effect, and that in the context of this study, this was normal because it was mandatory to use CMS for all employees of ENEO, irrespective of their age, gender or socio-professional category.

In terms of contributions, this study adds some inputs to the continuing research on the value and the adoption of IT in developing countries. However, there is at least one limitation that future research should consider; for instance, investigating the mediating effect of system use and user satisfaction in this study model, and determining the missing variables that may give better results.

This study has two main managerial implications. First, the importance of system quality. Companies like the one where we conducted the study need to adapt their systems to their employees' daily management tasks. Second, user satisfaction is very important as shown in this study, and managers should endeavor to reinforce all available systems for the sake of both user satisfaction and organizational performance.

References

1. Kanaracus, C.: Gartner: Global IT spending growth stable. InfoWorld (2017)
2. Petter, S., McLean, E.R.: A meta-analytic assessment of the DeLone and McLean IS success model: an examination of IS success at the individual level. Inf. Manage. **46**(3), 159–166 (2009)
3. Delone, W.H., McLean, E.R.: Information systems success: the quest for the dependent variable. Inf. Syst. Res. **3**(1), 60–95 (1992)
4. Delone, W.H., McLean, E.R.: The DeLone and McLean model of information systems success: a ten-year update. J. Manage. Inf. Syst. **19**(4), 9–30 (2003)
5. Gorla, N., Somers, T.M., Wong, B.: Organizational impact of system quality, information quality, and service quality. J. Strateg. Inf. Syst. **19**(3), 207–228 (2010)

6. Ives, B., Olson, M.H., Baroudi, J.J.: The measurement of user information satisfaction. Commun. ACM **26**(10), 785–793 (1983)
7. Cyert, R.M., March, J.G.: A Behavioral Theory of the Firm. Prentice-Hall, Englewood Cliffs (1963)
8. Godin, G., Gagné, C., Université Laval: Groupe de recherche sur les aspects psychosociaux de la santé, Les théories sociales cognitives: guide pour la mesure des variables et le développement de questionnaire. Groupe de recherche sur les aspects psychosociaux de la santé, École des sciences infirmières, Université Laval (1999)
9. Hair, J.F., Hult, G.T.M., Ringle, C., Sarstedt, M.: A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). SAGE Publications, Thousand Oaks (2016)
10. Kefi, H., Mlaiki, A., Kalika, M.: Shy people and Facebook continuance of usage: does gender matter? In: 16th Americas Conference on Information Systems, Sustainable IT Collaboration Around the Globe, AMCIS 2010, Lima, Peru, 12–15 August 2010, p. 27 (2010)
11. Malhotra, N.K.: Marketing Research: An Applied Orientation. Prentice Hall, Upper Saddle River (1999)
12. Fornell, C., Larcker, D.F.: Evaluating structural equation models with unobservable variables and measurement error. J. Mark. Res. **18**(1), 39–50 (1981)
13. Gefen, D., Straub, D.W.: A practical guide to factorial validity using PLS-graph: tutorial and annotated example. CAIS **16**, 5 (2005)
14. Straub, D.W., Boudreau, M.-C., Gefen, D.: Validation guidelines for IS positivist research. CAIS **13**, 24 (2004)
15. Bradley, R.V., Pridmore, J.L., Byrd, T.A.: Information systems success in the context of different corporate cultural types: an empirical investigation. J. Manage. Inf. Syst. **23**(2), 267–294 (2006)
16. Gefen, D., Straub, D.: A practical guide to factorial validity using PLS-graph: tutorial and annotated example. Commun. AIS **16**, 91–109 (2005)
17. Fornell, C., Larcker, D.: A second generation of multivariate analysis: classification of methods and implications for marketing research. Rev. Mark. **1**, 407–450 (1987)
18. Mooney, J.G., Gurbaxani, V., Kraeme, K.L.: A process oriented framework for assessing the business value of information technology. SIGMIS Database **27**(2), 68–81 (1996)