Organisational Culture and the Implementation of Hospital Information Systems: Evidence from Ghana.

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Abstract

Background: The study examined the relationship between organisational culture and the successful implementation of a Hospital Information System in a provincial hospital in Ghana. Organisational culture was operationalized and measured using the Competing Values Framework (CVF), whiles the successful implementation of an HIS was operationalized through the Technology Acceptance Model, such that organisational culture either influenced directly, attitudes towards the use of the HIS or indirectly through perceived usefulness (PU) or perceived ease of use (PEOU) of the HIS.

Methods: Using a cluster-based sampling technique, data for the study was collected from 120 staff members and was analyzed using descriptive statistics and Partial Least Squares based Structural Equation Modeling (PLS SEM).

Findings: The results of the study suggest that although a positive direct relationship exists between organisational culture and successful HIS implementation, the relationship is not significant. On the contrary, organisational culture is significantly correlated with successful HIS implementation but through PU rather than PEOU.

Conclusion: We argue that this finding is a reflection of the heterogeneity of the interpretations of culture at the different levels of analysis. As such health facility-related employees who operate in different context and levels of the organisation, may be more interested in the usefulness of a change as opposed to how easy it is for them to adjust to a change program in an organisation.

Keywords: Organisational culture, Implementation, Hospital information systems, Ghana

INTRODUCTION

In Africa and several other developing countries, the use of Hospital Information Systems (HIS) is limited, with isolated examples in few countries (Sanja, 2013). This is because most hospitals in Africa are financially incapable of purchasing such expensive Enterprise Resource Planning Systems (ERPs) such as an HIS. Even for the few who do, the nature of their institutions, structures and procedures make the implementation of such complex systems very challenging (Asangansi, 2012). Some of these challenges emanate from the need to effect changes to organisational or business processes, culture, and in certain situations, the structure of the organisation (Escobar-Rodríguez & Bartual-Sopena, 2015; Nambisan, Kreps, & Polit, 2013).

Even where the issues raised above are non-existent, implementing and using an HIS will require cooperation among all health professionals, high level of team work, re-designing of certain aspects of hospital operations and in some situations, changes in work routines. Thus, organisational culture may serve as a reference point for effecting such changes, which may in turn affect employees' perception and interpretation of organisational change and ultimately the way change is embraced (Ke & Wei, 2008). This suggests that organisational culture can affect the implementation of an HIS, with the reverse also being true (Nowinski *et al.*, 2007) .

In Ghana, only a few private and public hospitals have implemented one form of HIS or the other, despite the enormous perceived benefits. A typical example of the few is the Eastern Regional Hospital (ERH), a provincial level state owned hospital in the Eastern region of Ghana.

The implementation of the HIS in the ERH started in 2010, beginning with phase 1, where modules on National Health Insurance (NHIS) billing, Pharmacy, stores and accounting were implemented simultaneously. This was followed by phase 2: Outpatient records, phase 3: laboratory and phase 4: In-patients. The implementation of phase 4 was yet to start at the time of data collection.

At the moment, phases 1 to 3 have been completed and are in full use. Although the entire implementation process is not complete, the fact that phases 1 to 3 have been completed and currently in use without any major challenge, can be looked at as some form of success in the implementation of the HIS. Thus, the objective of this study is to use the ERH as a case to examine the influence of organisational culture on the successful implementation of an HIS.

LITERATURE REVIEW

Organisational Culture

The concept of organisational culture has a long tradition in the management literature albeit that there is currently no consensus in terms of definition (T. Scott, Mannion, Davies, & Marshall, 2003). Notwithstanding the multiplicity of definitions in the literature, organisational culture is posited as constituting "the pattern of shared basic assumptions invented or discovered or developed by a given group as it learns to cope with its problems of external adaptation and integration, that has worked well enough to be considered valid and therefore to be taught to new members as the correct way to perceive, think, and feel in relation to

those problems" (Schein, 1996). Others believe that organisational culture captures social interactions within organisations and therefore constitute the social glue that holds organisations together (Cameron & Quinn, 2005; Quinn & Rohrbaugh, 1983). This may include an organisation's customary dress, language, behavior, beliefs, values, assumptions, symbols of status and authority, myths, ceremonies and rituals (Ngwenyama & Nielsen, 2003). In other words, organisational culture captures the character and norms of an organisation, its practices and shared values, attitudes, beliefs or perceptions held consciously and unconsciously by employees within an organisation, that is passed on to new members of the organization (J. T. Scott, Rundall, Vogt, & Hsu, 2005). Based on the foregoing, one can argue that Organisational culture has the potential to be used as a powerful tool for quality improvement and as an aid to understanding the management of change, such as the implementation of an HIS in healthcare organisations (T. Scott *et al.*, 2003).

Attempts at conceptualizing organizational culture abounds in the management literature, with the Competing Values Framework (CVF) (Cameron & Quinn, 2005; Quinn & Rohrbaugh, 1983) being the most frequently and widely used organisational culture framework in healthcare settings (T. Scott *et al.*, 2003; Stock, McFadden, & Gowen, 2007). Hence, the decision to use it in this paper. The CVF is a synthesis of organisational theories and characterized along two dimensions that reflects different value orientations (Hartnell, Ou, & Kinicki, 2011). The first dimension or set of competing values is the flexibility-control axis. This is the de-

gree to which an organisation emphasises change or stability. It reflects decentralization and flexibility as opposed to centralization and control. A flexibility orientation depicts spontaneity, while a control orientation reflects stability and order. The second dimension or set of competing values is the internal-external axis. Here, the focus is on whether the organisation's orientation is on internal activities or the external environment or entities such as regulators, competitors, suppliers, partners and customers. An internal orientation places emphasis on the maintenance and improvement of the existing organisation, while an external orientation reflect an emphasis on competition, adaptation, and interaction with external entities (Stock *et al.*, 2007).

The two dimensions (flexibility-control and internal-external) produces four major organisational culture orientations. These are group (team), developmental (adhocracy/entrepreneurial), rational (market) and hierarchical (bureaucratic) cultures (Cameron & Quinn, 2005; Helfrich, Li, Mohr, Meterko, & Sales, 2007; Stock *et al.*, 2007). It is important to emphasise that the four cultural orientations are not mutually exclusive. Thus, an organisation may exhibit a combination of different culture orientations although one may be dominant (Cameron & Quinn, 2005) (Stock *et al.*, 2007).

Notwithstanding the combinations an organisation may be pursuing, Quinn (Quinn, 1988) suggests that a balanced culture proffers a distinct advantage in managing environmental shifts. For the purposes of measurement, the components and emphasis of each of the four cultural orientations is captured by a set of questions

(Organisational Culture Assessment Instrument - OCAI) based on the CVF and used by prior authors to measure organisational culture (Cameron & Quinn, 2005).

Organisational Culture and HIS Implementation

Having defined organisational culture and how it can be measured, the study operationalises successful implementation of an HIS to mean acceptance and use of the HIS by employees in the performance of their job functions. Following from the existing literature, the use of a system can be conceptualized using the Technology Acceptance Model (TAM). The TAM postulates that an individual's decision to use a system (i.e. the HIS), captured by their attitudes towards use, is determined by two beliefs. First is the perceived usefulness (PU) of the system, which is defined as the extent to which a person believes that using a system will enhance his/her job performance. The second is the perceived ease of use (PEOU) of the system, which is also defined as the extent to which a person believes that using a system will be free of effort (Davis, Bagozzi, & Warshaw, 1989; Venkatesh & Davis, 2000). Thus, we argue as per Figure 1 below that organisational culture will influence the success of an HIS implementation (i.e. attitudes towards use) through two channels. The first channel is expected to be a direct transmission between organisational culture and attitudes towards the use of the HIS. The second is an indirect transmission from organisational culture to attitudes towards use, through PEOU on one hand and PU on the other. Although it is possible for PEOU to influence PU as advocated for in some of the studies using TAM (Davis *et al.*, 1989; Venkatesh, 2000), the current study does not explore that link given that our focus is mainly on the transmission from organisational culture to successful HIS implementation.

Figure 1: Organisational Culture and Implementation of an HIS
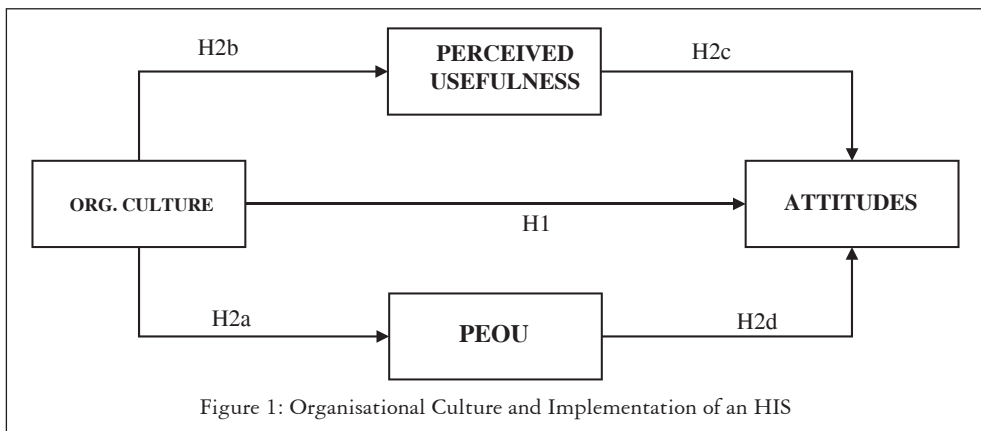
Source: Constructed by Author based on literature

Although TAM compares favourably with alternative models such as the Theory of Reasoned Action and the Theory of Planned Behaviour (Venkatesh, 2000; Venkatesh & Davis, 2000), TAM was chosen on the basis that it has often been

used to explain or examine the influence of factors such as shared beliefs (Ramayah & Lo, 2007), training, communication, top management support, cooperation and technological complexities (Bueno & Salmeron, 2008) on IT systems acceptance. Additionally, there are others who have used TAM to examine the influence of external factors such as technological innovativeness, computer anxiety, computer experience, computer self-efficacy, system performance, system functionality, support, social influence, communication as well as training and business process fit on attitude towards the use of ERPs (Sternad, Gradisar, & Bobek, 2011). From the fore going discussion on the relationship between organisational culture and successful implementation of an HIS, we hypothesize as follows:

H1: Organisational culture is positively and significantly correlated with attitudes towards the use of the HIS

H2: Organisational culture indirectly affect attitudes towards the use of the HIS through PU and PEOU of the HIS as follows:

> *H2a: Organisational culture significantly affect PEOU of the HIS*

> *H2b: Organisational culture significantly affect PU of the HIS*

> *H2c: Perceived usefulness of the HIS affect attitudes towards its use*

> *H2d: Perceived ease of use of the HIS affect attitudes towards its use*

METHODOLOGY

Context

Users of the HIS in the ERH formed the population (174) from which the sample was taken. The ERH is a referral facility operated by the Ghana Health Service. The hospital is a 350-bed hospital and has the following clinical departments: internal medicine, surgery (general surgery, pediatric surgery and genitourinary surgery), obstetrics and gynecology (including antenatal care clinic, family planning and reproductive health service clinic) ear-nose and throat, eye, out-patient-department, emergency department, dental, herbal medicine, nursing, physiotherapy, laboratory, public health, nutrition, and pharmacy. The administrative and allied departments include: finance, internal audit, general administration, human resource, medical records, information technology, biomedical engineering, procurement, stores and supply, transport, estates and maintenance, catering, environmental health and mortuary.

The organizational structure of the hospital has five levels and is headed by a Medical Director who reports to the Director-General of the Ghana Health Serverice through the Regional Director of Health Services. The following heads; Head of Clinical Services, Head of Nursing, Head of Administration, Head of Pharmacy and Head of Finance together with the Medical Director, constitute the Hospital Management Team, with the Medical Director as the chair. The IT unit is headed by a manager who reports to the Head of Adminsitration, and has 3 permanent and 4 contract staff who are deployed to units of the hospital on demand on daily basis. The ERH HIS was built around a custom-

ised off-the-shelf software. It is important to emphasise that the procurement of the HIS and subsequent customisation and implementation was done with inputs from management and staff of the hospital.

Variable Definition and Data Collection

Three key set of variables; socio-demographic characteristics of respondents, organisational culture and acceptance of the HIS were used in the study. Socio-demographic information of respondents, which include age, gender, profession, experience and HIS related training are captured in Table 1. Consistent with the literature and in line with the CVF, organisational culture was captured by the four concepts earlier discussed (i.e. group orientation, developmental orientation, rational orientation, and hierarchical orientation). Each of these concepts is measured by a six-item questionnaire on a five-point Likert scale (see Table 2) adapted from the existing literature. The HIS acceptance is operationalized through TAM and is measured by three key constructs (i.e. perceived ease of use, perceived usefulness and attitudes towards use). For each of the three TAM constructs, specific questions based on the existing literature (Amoako-Gyampah & Salam, 2004; Calisir & Calisir, 2004; Davis *et al.*, 1989; Venkatesh & Davis, 2000) and measured on a five-point Likert scale were asked to measure the construct in question (see Table 3). For both organizational culture and TAM, the five-point Likert scale is coded as follows: 1=Strongly disagree, 2=Disagree, 3= Some what Agree, 4=Agree and 5=Strongly Agree.

Prior to the data collection exercise, ethical clearance was obtained from the Eastern Regional Hospital's Ethics Committee. Beside the ethical clearance, all questionnaires contained a statement of consent, which respondents read and agreed to verbally before completing the questionnaire. Using a confidence interval of 5% and confidence level of 95%, a statistically representative sample of 120 members of staff who use the HIS was selected (using cluster-based probability sampling) to answer the study questionnaire. First, the population of staff who work with the HIS (174) were divided into 6 clusters (i.e. Doctors and Medical Assistants-MA's, Nurses, Pharmacist, Allied Health Staff, Medical Records and Administrative Staff). The administrative staff is made up of accounts and other administrative staff (see details in Table 1). Using probability proportional to size, respondents were selected from each of the clusters (Doctors and MA's - 24, Nurses - 15, Pharmacists - 6, Allied Health Staff – 16, Medical Records - 25 and Administrative Staff - 34) to ensure fair representation. One of the researchers who is experienced in field data collection administered the questionnaire to the respondents. The first section of the questionnaire gathered information on the socio-demographic characteristics of the respondents. The second and third sections of the questionnaire gathered information on organisational culture and acceptance of the HIS. In all, 119 out of the 120 questionnaires administered were completed and returned. The relatively high response rate is also due to the fact that management of the hospital were interested in the results of the study and so verbally encouraged staff of the hospital to complete the questionnaire. Further, respondents were assured of anonymity and

hence no part of their answers could be traced to them in any way.

Data Analysis Procedures

The data collected was analyzed using descriptive statistics and Partial Least Squares-based Structural Equation Modeling (PLS SEM) technique. Descriptive statistics were used to explore the extent to which users perceived the HIS in terms of its usefulness, ease of use and attitudes of employees towards the HIS. The SEM technique was used to explore various relationships as outlined in the conceptual model. The use of the SEM procedure is on the basis that it is ideal when dealing with variables that are unobserved or measured with multiple indicators (Hair Jr, Hult, Ringle, & Sarstedt, 2016). Additionally, the PLS-based SEM is non-parametric and does not make any strict assumptions concerning the distribution of the population from which the sample was taken. These properties of the PLS-based SEM makes it possible to produce relatively better and accurate estimates of the postulated model from the relatively small sample used in this study.

RESULTS

Background Socio-demographic Characteristics

The demographic characteristics of respondents are given in terms of their age, gender, highest education as well as length of stay at the hospital. Table 1 provides details of the demographic characteristics

of the respondents. Age of the respondents ranged from a minimum of 20 years to a maximum of 57 years, with the average age being approximately 31 years. More than half of the respondents (55.5%) were between the ages of 20 to 30 years. Males (58%) were more than females (42%) in the sample. The difference is however not too much as to make the sample overly skewed towards males. As earlier indicated, respondents come from different health-related professions. The profession with the highest representation in the sample is medical records (21%). Also, majority of the respondents (68%) had worked in the hospital for either 5 years or less.

Although longer years of service will enhance respondent's knowledge of the hospital, we nonetheless believe that 5 years is a long time enough for the respondents to know a lot about the hospital. In terms of educational level, majority of the respondents had at least a bachelor's degree or its equivalent against a few that had just a junior secondary school (3.4%) and a senior secondary school certification (10.9%). Table 1 shows the details of respondents' professional experience in Information Technology (IT) before the implementation of the HIS. The data suggest that an appreciable number of respondents (34.5%) had no experience with the use of IT, with the average period of usage being approximately 4 years. However, with regards to training needs, most respondents (65%) indicated that they had received appropriate training as part of the HIS implementation.

Table 1: Background and Socio-demographic Characteristics of Respondents

Variables	Freq	%	Variables	Freq	%
Age grouping			**Years in Hospital**		
20-30 years	66	55.5%	5 years or less	81	68.1%
31-40 years	39	32.8%	6 - 10 years	24	20.2%
41-50 years	9	7.6%	11 - 15 years	4	3.4%
Above 50 years	5	4.2%	Above 15 years	5	4.2%
Gender			**Years of IT Experience**		
Male	69	58.0%	None	41	34.5%
Female	50	42.0%	5 years and less	33	27.7%
Profession			6 - 9 years	18	15.1%
Lab Technician	16	13.4%	10 - 14 years	9	7.6%
Pharmacist	6	5.0%	15-19 years	2	1.7%
Nurse	15	12.6%	More than 20 years	4	3.4%
Doctor	18	15.1%	No response	12	10.1%
Medical Assistant	6	5.0%	Training on HIS		
Medical Records	25	21.0%	Yes	78	65.5%
Accounts	13	10.9%	No	36	30.3%
Others	20	16.8%	No response	5	4.2%
Highest Education					
Junior Secondary/HighSchool	4	3.4%			
Senior Secondary/High School	13	10.9%			
Higher National Diploma	20	16.8%			
Bachelors degree/equivalent	66	55.5%			
Master's degree/equivalent	16	13.4%			

Source: Constructed by authors based on field data

Constructs of Organisational Culture

The descriptive results on the different concepts measuring organisational culture are presented in Table 2 below using means and standard deviations as per the definition of the Likert scale. Thus, a mean of 1 indicate a strong disagreement to the question asked, with 5 being an indication of a strong agreement.

Table 2: Organisational Culture Dimensions and their Descriptions

Variable	Mean Score	Standard Deviation
Group orientation		
The organisation is a very personal place. It is like an extended family. People seem to share a lot of themselves.	2.98	1.03
The leadership in the organisation is generally considered to exemplify mentoring, facilitating or nurturing	3.44	0.91
The glue that holds the organisation together is loyalty and mutual trust. Commitment to this organisation runs high.	3.34	1.05
The organisation emphasizes human development. High trust, openness, and participation persists.	3.41	0.93
The management style in the organisation is characterized by teamwork, consensus, and participation.	3.63	0.91
The organisation defines success on the basis of the development of human, teamwork, employee commitment, and concern for people.	3.55	0.96
Overall Average	**3.39**	
Developmental Orientation		
The organisation is a very dynamic and entrepreneurial place. People are willing to stick their necks out and take risks.	2.97	1.03
The leadership in the organisation is generally considered to exemplify entrepreneurship, innovation or risk-taking.	3.28	0.95
The glue that holds the organisation together is commitment to innovation and development. There is an emphasis on being on the cutting edge.	3.41	0.88
The organisation emphasizes acquiring new resources and creating new challenges. Trying new things and prospecting for opportunities are valued.	3.38	0.89
The management style in the organisation is characterized by individual risk taking, innovation, freedom and uniqueness.	3.03	0.95
The organisation defines success on the basis of having the most unique or newest products. It is a product leader and innovator.	3.23	0.95
Overall Average	**3.22**	
Rational Orientation		
The organisation is very results-oriented. A major concern is with getting the job done. People are very competitive and achievement oriented.	3.55	0.92
The leadership in the organisation is generally considered to exemplify no-nonsense, aggressive, results-oriented focus.	3.27	0.99
The glue that holds the organisation together is the emphasis on achievement and goal accomplishment.	3.70	0.77
The organisation emphasizes competitive action and achievement. Hitting stretch targets and winning in the marketplace are dominant.	3.32	0.86
The management style in the organisation is characterized by hard-driving competitiveness, high demands and achievement.	3.27	0.85
The organisation defines success on the basis of the wining in the marketplace and outpacing the competition. Competitive market leadership is key.	3.32	0.92

Overall Average	**3.40**	
Hierarchical Orientation		
The organisation is a very controlled and structured place. Formal procedures generally govern what people do.	3.58	0.89
The leadership in the organisation is generally considered to exemplify coordinating, organizing or smooth-running efficiency.	3.31	0.73
The glue that holds the organisation together is formal rules and policies. Maintaining a smooth-running organisation is important.	3.64	0.79
The organisation emphasizes permanence and stability. Efficiency, control and smooth operations are important.	3.64	0.80
The management style in the organisation is characterized by security of employment, conformity, predictability and stability in relationships.	3.41	0.87
The organisation defines success on the basis of efficiency. Dependable delivery, smooth scheduling, and low-cost production are critical.	3.44	0.96
Overall Average	**3.50**	

Source: Constructed by authors based on field data

The first dimension of organisational culture (group culture) had management style as its dominant indicator. This recorded an average value of 3.63 with an associated standard deviation of 0.91. This was followed by the criteria for success, which had the second highest average score (Mean = 3.55, SD = 0.91). The item with the least average score (Mean = 2.98, SD = 1.03) is related to organisational characteristics (i.e. whether people share a lot of themselves and the organisation act as an extended family). The second dimension describes developmental organisational culture. The average score ranged from a minimum of 2.97 to a maximum of 3.41. The least considered indicator was organisational characteristics, which emphasises risk taking. The indicator with the highest score is organisational glue, which emphasises the fact that commitment to innovation and development is important in holding the organisation together. The third dimension of organisational culture describes rational orientation. In this di-

mension, the most dominant indicator is organisational glue, which emphasises achievement and goal accomplishment (Mean = 3.7, SD = 0.77). This is followed by the indicator on organisational characteristics, which emphasises the fact that people are very competitive and achievement oriented (Mean = 3.55, SD = 0.92). Management style, which emphasises high demand and competitiveness is the indicator with the lowest score (Mean = 3.27, SD = 0.85). For the last dimension (hierarchical culture), organisational glue and organisational emphasis had the highest average score. Whiles Organisational glue emphasises formal rules and policies and maintaining a smooth running of the operations of the organisation, organisational emphasis focuses on permanence, stability and efficiency. The item with the least score on this dimension is leadership within the organisation, which emphasises coordination, organising and efficiency (see Table 2). A look at the overall average score of the various constructs suggest

that hierarchical organisational culture is the most dominant dimension of organisational culture in the ERH. Notwithstanding the differences in the average score of the different dimensions of organisational culture, results of the analysis of variance indicate that at 5% level of significance, there is no significant difference in the average score of the four dimensions of organisational culture in the ERH ($F = 2.54, p = 0.086$). Thus, organisational culture is used in the model as a composite indicator rather than the individual components.

Perceived Usefulness, Perceived Ease Of Use And Attitudes Towards Use Of The HIS

From Table 3, a total of 4 items were used to describe PU. Out of these 4, the ability of the HIS to improve performance of the job or task at hand had the highest score (Mean = 3.93, SD = 0.77). This is followed by the ability to complete tasks in a quick manner (Mean = 3.87, SD = 1.00). The item with the least average score is the ability of the HIS to support certain critical aspects of the user's job (Mean = 3.63, SD = 0.93).

Concerning PEOU of the HIS, the average scores ranges from a minimum of 3.0 and a maximum of 3.68. The item with the maximum average score was related to the fact that generally the HIS is not confusing (Mean = 3.64, SD = 3.00). The items on PEOU that had the least average score were users not making any errors when using the HIS as well as the HIS not requiring any form of mental effort to use it (Mean = 3.09, SD = 1.07). In addition, attitudes towards the use of the HIS was captured by 3 items with average score ranging from 3.6 to 4.0. The item with the highest average score was related to the use of the HIS being a good idea (Mean = 4.00, SD = 0.72). On the other hand, the item with the least average score was related to the use of the HIS being a pleasant thing. In other words, the users feel happy to use the HIS (Mean = 3.69, SD = 0.81). Table 3 provides the average scores for PU, PEOU and attitudes towards the use of the HIS.

Table 3: Levels Of Agreement Under The Dimensions Of The Technology Acceptance Model

Variable	Mean score	Standard deviation
Perceived Usefulness (PU)		
HIS improves job performance	3.93	0.77
HIS supports critical aspects of the user's job	3.63	0.93
HIS enables user to accomplish tasks more quickly	3.87	1.00
Using HIS makes it easier to perform a job	3.82	0.91
Perceived ease of use (PEOU)		
Using the HIS is not confusing	3.68	0.92
User does not make any errors using HIS	3.00	1.06
The HIS does not require lots of mental effort	3.09	1.07
The HIS is easy to use	3.64	0.83
The HIS helps users find it easy to get what they want	3.48	0.92
Attitudes Towards Use (ATTU)		
It is a good idea to use the HIS	4.00	0.72

Using the HIS is pleasant	3.69	0.81
Using the HIS is beneficial	3.86	0.68

Source: Constructed by authors based on field data

Measurement Model and Structural Model Assessments

Measurement Model

Confirmatory factor analysis was used to test for the reliability of the indicators (i.e. items) used for the different organisational culture and TAM constructs (measurement model). The essence of the reliability test is to ensure that indicators used to capture a particular construct uniquely and collectively measure the construct in question and not another. Two validity tests; convergent (construct) validity and discriminant validity tests were used in the confirmatory factor analysis. The results of the test are presented in Table 4 and Table 5 below.

Table 4: Tests for Convergent Validity

Construct	AVE	Composite Reliability
ATTU	0.57	0.79
PEOU	0.52	0.75
PU	0.68	0.89
Org. Culture	0.53	0.95

Source: Constructed by authors based on field data

Table 5: Discriminant Validity Tests

	ATTU	PEOU	PU	Org Culture
ATTU	0.76			
PEOU	0.24	0.72		
PU	0.44	0.46	0.82	
Org Culture	0.21	0.4	0.41	0.73

Source: Constructed by authors based on field data.

The construct validity of the various latent variables or constructs were assessed by the loadings of each of the indicators on their respective factors; the composite reliability score and the Average Variance Extracted (AVE) scores. Indicators with poor loadings (loadings less than 0.7) were taken out of the construct. Thus, indicators that did not meet this criterion were taken out of the model. Composite reliability as in Table 4 measures the level of internal consistency among the indicators that identify a construct. The rule of thumb for an internally consistent construct is a composite reliability score of 0.7 or more (Nunnally & Bernstein, 1994). From Table 4, all the indicators used passed the composite reliability test as they are all above 0.7. The AVE on the other hand measures the proportion of variance that is extracted

by the indicators in relation to a specific construct. The acceptable threshold for the AVE is a score of 0.5 or more, meaning the indicators of the construct need to explain at least half of the total variation (Nunnally & Bernstein, 1994). As per the results in Table 4, all the constructs had at least half of their variations explained by their respective indicators.

Discriminant validity was also tested for, using the Fornell & Larcker criterion. It is expected that for each construct, the square root of the amount of variance explained (AVE score) should be more than the pairwise correlations between the constructs (Nunnally & Bernstein, 1994; Oli-

va, Oliver, & MacMillan, 1992). Table 5 shows the results of the discriminant validity test of the constructs and indicates that the values of the square root of the AVE of most of the indicators are more than the inter construct correlations.
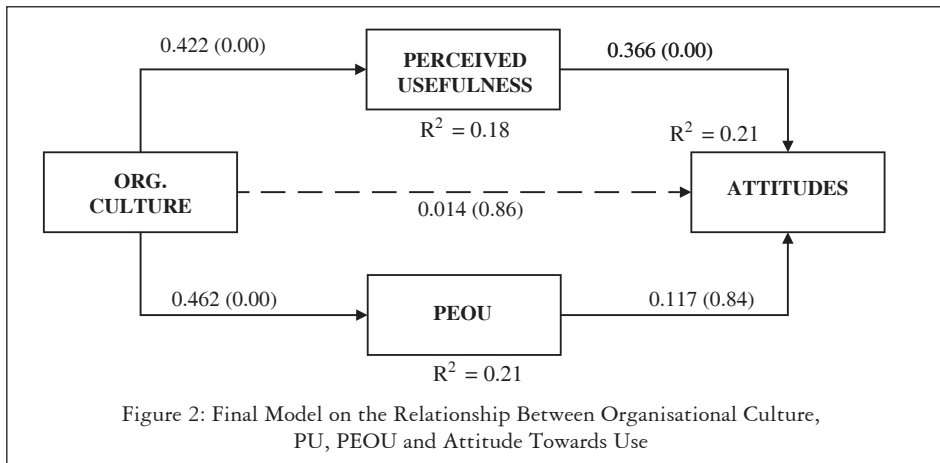
Structural Model Specification

The effect of organisational culture, PU and PEOU on attitudes towards the use of the HIS was determined simultaneously using a PLS structural model. Table 6 below provides the results of the structural model. To fit the results into the framework for the study, the results in Table 6 is represented in Figure 2 below.

Table 6: Effect of Organisational Culture on PU PEOU and Attitudes Towards Use

Independent variable	Coefficient	P-value	R-square
Model 1[a]			
Perceived usefulness	0.366	0.00	0.21
Perceived Ease of use	0.117	0.84	
Organizational culture	0.014	0.86	
Model 2[b]			
Organisational culture	0.462	0.00	0.18
Model 3[c]			
Organisational culture	0.422	0.00	0.117

Source: Calculated by authors based on field data. Note that [a]Dependent variable is attitudes towards use, [b]Dependent variable is Perceived ease of use and [c]Dependent variable is Perceived usefulness. Note also that estimated coefficients are significant at p<0.01, p<0.05 and p< 0.1

Figure 2: Final Model on the Relationship Between Organisational Culture, PU, PEOU and Attitude Towards Use

Source: Constructed by Authors based on results from Table 6

The results in Figure 2 and Table 6 above suggest a positive relationship between organisational culture and attitudes towards the use of the HIS, although the coefficient is not significant (p = 0.86). Hence H1, the first major hypothesis is not supported by the results. The second major hypothesis looked at an indirect relationship between organisational culture and attitudes towards the use of the HIS. This was further broken down into four sub hypotheses (H2a, H2b, H2c, H2d). As shown in Figure 2, a significant positive relationship exists between organisational culture and PEOU of the HIS. Thus, H2a is supported. In terms of the relationship between organisational culture and PU as described by H2b, the results reveal a significant positive relationship between the two constructs. In addition, H2c predicts a significant positive relationship between PU of the HIS to attitudes towards the use of the HIS. However, H2d is not supported since there is no significant correlation between PEOU of the HIS and the attitudes of employees towards its use.

Table 7: Test for Mediation Role of Perceived Usefulness

Relationship	Standardised coefficient	T-stat	p value	Standard error
Model without mediator				
Org. Culture – ATTU	0.297	1.667	0.0976	
Model with mediator				
Org. Culture –ATTU	0.08	0.45	0.65	0.18
Org. Culture – PU	0.42	2.78	0.01	0.16
PU – ATTU	0.41	3.30	0.00	0.14

Source: Constructed by authors based on field data. Note also that estimated coefficients are significant at p<0.01, p<0.05 and p< 0.1

Based on the results of H2b, one can argue that PU of the HIS could be a variable that mediates the relationship between organisational culture and attitudes towards the

use of the HIS. To test for the presence of the mediating role of PU, three separate regressions (see Table 7 above) were estimated. The first examined the direct relationship between organisational culture and attitudes towards the use of the HIS. The results suggest a marginally significant relationship at a 10% level of significance (p=0.097). Thus, in the absence of the hypothesized mediating variable (PU), a direct relationship between organisational culture and attitudes towards use of the HIS is confirmed.

The second regression examined the relationship between organisational culture and attitude towards the use of the HIS in the presence of the hypothesized mediation variable. The strength of the relationship reduced from 0.297 to 0.08 and is no longer significant (p=0.65). On the other hand, a significant relationship exist between organisational culture and PU as well as PU and attitude towards the use of the HIS. The Sobel test statistic produced significant results (p = 0.02), which indicates that PU of the HIS significantly mediates the relationship between organisational culture and attitudes towards the use of the HIS. Additionally, the results highlight two important findings. First, the standardized regression coefficient on the relationship between organisational culture and attitude towards use of the HIS drops after introducing the mediator variable. Secondly, the direct relationship between organisational culture and ATTU (see Figure 2) is not significant. This suggest that PU of the HIS acts as a full mediator in the relationship between organisational culture and attitudes towards the use of the HIS.

Discussion

As per the literature reviewed, the CVF is characterised around two value orientations (i.e. the flexibility-control axis or the internal and external orientation). Per the descriptive results, the higher mean score for the hierarchical orientation (3.50) compared to the rational orientation (3.40) and developmental orientation (3.22) suggests a higher emphasis on cultural values such as stability, structure and control (i.e. core traits of the hierarchical and rational culture) compared to flexibility and innovation, for both internal and external orientations. Hospitals often work with rules, guidelines and protocols that are often strictly adhered to for purposes of patient safety. Additionally, the increasing number of legal challenges arising from the negative outcome of medical procedures may equally mean the need for health professionals to strictly work according to established rules and protocols in other to reduce their level of legal risk exposure. This may explain why values related to stability, structure and control are favoured over flexibility and innovation. In terms of the TAM construct, the descriptive results suggest that the usefulness of the HIS is more important to users compared to the ease of use, as the mean score is higher for the former (3.81) compared to the later (3.38).

The results of the structural model are however mixed. As already indicated, the direct relationship between organisational culture and use of the HIS (represented by attitudes towards use) is positive but insignificant. This is surprising, given that one expect organisational culture to serve as a reference point for effecting changes in an organisation (Ke & Wei, 2008). Thus, one expects that as suggested by Nowin-

ski and colleagues (Nowinski *et al.*, 2007), organisational culture will be significantly correlated with attitudes towards the use of the HIS. The lack of significance may be explained from two viewpoints. First, there is evidence in the management literature that suggest that other organisational factors (incentives, resource availability etc.) other than organisational culture influences the success of HIS implementation (Aqil, Lippeveld, & Hozumi, 2009; Kamadjeu, Tapang, & Moluh, 2005; Lorenzi, Riley, Blyth, Southon, & Dixon, 1997; Yusof, Kuljis, Papazafeiropoulou, & Stergioulas, 2008). The fact that these factors are not directly captured in the current model may explain why the direct transmission between organisational culture and use of the HIS is not significant. Secondly, the insignificance may be explained by the mediating role of PU and PEOU on the transmission from organisational culture to attitudes towards the use of the HIS as shown in Figure 2. This is confirmed by the re-estimated results in Table 7 (i.e. a marginally significant relationship between organisational culture and attitudes towards use) when the mediating effect of both PU and PEOU are eliminated. Even where PU is left in the model as a mediating variable, the relationship between organisational culture and attitudes towards use of the HIS remains insignificant. This suggests that the relationship between organisational culture and attitudes towards use of the HIS may not be direct as hypothesised in H1. As per the results, the effect of organisational culture on attitudes towards use of the HIS is indirect, working through PU and PEOU. Additionally, the fact that the transmission from PU to attitudes towards use is significant, but that from PEOU to attitudes towards use is not significant

(see Figure 2) suggest that the mediation is through PU rather than PEOU. That is, the attitudes of employees towards organisational change such as the implementation of an HIS is more dependent on their perception of the usefulness of the change rather than how easy it is for employees to adjust to the change.

This finding is inconsistent with the main stream change management literature, which suggest that employee attitudes towards change is determined by the ease with which they are able to adapt, adjust or negotiate economic, social, psychological and security challenges that may be occasioned by the change (Cunningham *et al.*, 2002; Jimmieson, Terry, & Callan, 2004). This obviously raises the question of whether employees in a health facility-related environment such as a hospital are different or that organisational culture has often been erroneously conceptualised as being homogeneous.

On the issue of cultural homogeneity or the differentiated nature of health facility-related staff, it is suggested that diversity in cultural dimensions across different levels of analysis may lead to different interpretation of change in an organisation (DiBella, 1996; Kezar & Eckel, 2002; Ravasi & Schultz, 2006). Additionally, it has been argued that the relative influence of occupational and organisational culture on behaviour vary significantly across occupations (Schein, 1996). It is therefore not implausible that this result may be a reflection of the general nature of employees in a hospital environment, who by the nature of their training and regulated nature of their profession are more likely to seek for the interest of their clients, often times to the detriment

of their personal, economic, social and psychological interest as suggested by Cabrera *et al.* (Cabrera, Cabrera, & Barajas, 2001). For example, Cabrera *et al.* (Cabrera *et al.*, 2001) argues that the regulated nature of physician practice means that the occupational culture of physicians is often immuned to administrative practices. Thus, physicians behaviour is often determined by their occupational culture and practices rather than the culture of the organisations in which they practice. The current results may be a confirmation of the heterogeneous nature of culture and how such heterogeneity at different levels of analysis shape the interpretations given to change programs such as the implementation of HIS in an organisation.

Implications

The paper set out to examine the relationship between organisational culture and the implementation of a Hospital Information System using a provincial level hospital as a case. Descriptive findings from the study suggest internal consistency for the items used to capture the different components of organisational culture. The current study confirms the reliability of the Competing Values Framework as a theoretical model for operationalizing and measuring organisational culture. Secondly, the findings of the study echo the fact that organisational culture may not in itself directly influence change in an organisation, but may rather influence those factors (in this case PU and PEOU) that drive change in an organisation. This understanding can be extremely important for practice. A key practice lesson from this finding is that practitioners such as healthcare managers may need to understand the effect of

organisational culture on the key drivers of change if they are to be successful in the implementation of change programmes such as the implementation of an HIS. Thirdly, the findings of the study also affirm the heterogeneity of organisational culture at different levels of analysis. As already indicated, such heterogeneity has implications for the nature and form of interpretations given to the same set of actions at different levels and therefore the way such interpretation influence change in an organisation. Thus, understanding that organisational culture is more nuanced and complex will help managers to do a better job of understanding the different interpretations given to actions of the organisation and how such interpretations are likely to affect change programmes initiated by the organisation.

CONCLUSION

The foregoing discussion suggest that organisational values such as stability, structure and control are favoured in a hospital environment compared to flexibility and innovation. In addition, perceived usefulness of the HIS was seen as more important compared to perceived ease of use. This aspect of the findings which essentially suggest that the internal culture associated with a given profession may exert differential influence on perceived usefulness or ease of use of an HIS constitute an important contribution both to the literature and practice. As earlier indicated, the existing change management literature has mostly suggested that the ease of adaptation to a change process is a key determinant of acceptance of that change compared to it usefulness. Thus, the realisation that this is a more nuanced process and

may depend on the internal professional culture of employees in question is key to understanding employee acceptance of change processes in organisations. It can also be suggested from the results of the study that perceived usefulness mediate the relationship between organisational culture and attitudes towards the use of the HIS. Organisational culture affects both perceived usefulness and perceived ease of use. However, the transmission from perceived ease of use to attitudes towards the use of the HIS is not significant, implying that the effect of organisational culture on attitudes towards the use of the HIS may work through perceived usefulness of the HIS.

It is also important to point out that using a more diversified sample (for example government, quasi-government, private and mission hospitals) instead of just a single government hospital would have provided more nuanced results compared to the current results. It is therefore recommended that future work in this area can address this challenge by using a more diversified sample as suggested.

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