Impact of perceived HIS users' performance on job satisfaction: moderating effect of perceived HIS quality

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Abstract: The study examines the effect of perceived healthcare information system users' performance on their job satisfaction, and the moderating role of employees' perception of the healthcare information system's quality on the relationship. The results show that the perceived quality of the system coupled with their perceived performance using the system affects their job satisfaction. Moreover, in these facilities, health information systems add value to their services at the expense of the employees' workload and perceived performance, and thereby satisfaction. Therefore managers and administrators need to provide inclusion programs as well as training workshops and follow-up sessions. In addition, these healthcare facilities can build internal marketing programs to boost employees' perception of the system's quality and use.

Keywords: healthcare; information system; HIS quality; performance; job satisfaction.

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1 Introduction

The digital divide is unfolding with a burden. This burden is mainly felt at the employees' end in general. It is more heavily felt in healthcare facilities, where learning to navigate the new technology is demanded, and is taxing on the staff who feel pressured to learn how to use the new tools at hand for two reasons. First, these employees need to perform their health/patient-care related duties, and second, they need to improve their personal performance on the job. Therefore, this study attempts to analyse the effect of the information system user's perception of their performance, on their respective job satisfaction. And as Healthcare Information Systems (HIS) are becoming more and more important to the success of the industry (Zarour, 2016), user satisfaction is, on one hand, gaining significance in this success (Sinha and Kurian, 2014). On the other hand, HIS failure is reported to be due to organisational and psychological issues (Cheng et al., 2008). Therefore, it becomes essential for the healthcare facilities' managers to assess the HIS end-user satisfaction to ensure system satisfaction and usage (Wixom and Todd, 2005).

Building on Davis's (1986) TAM as a tool, and Holden and Karsh's (2009) results from studying the impact of HIS, the study examines the scholarly literature on the topic, asks whether 'Perceived HIS Performance' leads to 'User Job Satisfaction' and if 'Perceived HIS Quality' moderates the relationship between 'Perceived HIS Performance' and 'HIS User Job Satisfaction'? The study suggests a model for testing for the sake of better understanding the relationship through a quantitative research exercise, in the healthcare facilities for the managerial benefit. It then displays the results and draws conclusions and recommendations.

2 Literature review

Huge advances in technology are reshaping our lives in all its aspects, providing leverage to businesses in every industry including healthcare (Turner et al., 2014; Kayyali et al., 2013). This increased use of technology in healthcare was initially observed in the use of electronic medical records (Taylor and Williams, 2015). The current trend calls for rapid digitisation of data even those previously collected and stored as hard copies (Mayer-Schönberger and Cukier, 2013). This trend is motivated by mandatory requirements and the potential to improve the quality of healthcare delivery, while simultaneously cutting on costs (Bates et al., 2014).

Today's digital environment is calling for the use of technology in healthcare through tele-health services, and mobile technologies that connect patients and doctors thousands of miles away through telecommunications and networks. Nowadays, patients are able to attend conferences with physicians in distant geographical locations, saving time and money that would have been spent on travelling. They are able to send health information to any specialist in the world almost instantly and receive timely feedback.

The use of HIS holds the promise of supporting a wide range of digitised administrative, medical and healthcare functions, including improving profits, cutting down on wasted overhead, predicting epidemics, cure disease, improving quality of life, avoiding preventable deaths, supporting clinical decision making, and managing population health (Stackowiak et al., 2015; Bates et al., 2014; Squires et al., 2013), in addition to our acceptance of, and ability to use technology, to analyse and understand this generated data (Bhartiya and Mehrotra, 2015; Anderson and Rainie, 2012).

2.1 Perceived his performance

Today's healthcare operations are directly correlated with technology (Simon et al., 2008; Campbell et al., 2006) as more and more tasks are becoming dependent on digital and networking technologies. Cooper and Zmud (1990) and Aggarwal and Prasad (1998), report that technology's success is related to the perception of employees about the introduced technology; hence affecting their performance at work (Zarour, 2016). This, in turn, leads to increasing their performance and resulting in higher job satisfaction (Martin and Huq, 2007), as well as boosting their motivation and perceived performance.

In this context, HIS improves the workflow process, creating safer patient-related procedures (Bates and Gawande, 2003). Once this technology is accepted by users, it succeeds (Igbaria and Tan, 1997; Seddon, 1997; DeLone and McLean, 1992) as its users' beliefs change (Karahanna et al., 1999; Davis, 1989); system quality, employee participation, and communication increases (Roberts et al., 2005), role perception becomes clearer (Goodhue and Thompson, 1995) and the employees' perception of technology becomes positive (Aggarwal and Prasad, 1998). As a result, the employees begin to see the system benefits and efficiencies in patient care and service delivery quality (Gabriel and Normand, 2012; Kane and Labianca, 2011), prevention and diagnosis (Fichman et al., 2011; Gabriel and Normand, 2012).

This, although McLoughlin and Dawson (2003), and Khong and Richardson (2003) conclude that HIS does not guarantee improved performance, whereas Joshi and Rai's (2000) report that IS, in general, improve productivity, and individual performance, allowing higher levels work involvement and resulting in higher levels of employees' performance and goal achievement (Tam and Robertson, 2002; Holden, 1999). Moreover, Aggarwal and Prasad (1998) relate interaction with the HIS, participation and knowledge about the system to the positive performance of the user, where their performance depends on their knowledge of the system (Sahinidis and Bouris, 2008) which in turn affects their performance (Swart et al., 2005). These interrelations play an important role in controlling work outcomes, and tasks performed through HIS (Joshi and Rai, 2000). In the latter process, supervisors influence technology acceptance and employees' actual and perceived performance using it (Igbaria and Tan, 1997; Schiffman et al., 1992; Fisher et al., 1989; Baroudi et al., 1986). Thus it is clear that scholars report a number of variables influencing perceived HIS performance. However, the question whether this perceived performance affects the employees' job satisfaction perception remains to clarify.

2.2 Perceived his performance and user satisfaction

During the last decade, many researchers took a closer look at the relationship between information technology user, and the user's perceived performance and satisfaction.

Understanding this relationship can help practitioners in developing better methods of using information technology systems (IS) and evaluating their impact on healthcare institutions and user-perceived performance (Fu and Deshpande, 2014; Lee and Kim, 2009).

A plethora of research addresses the relationship between IS, end-user performance and job satisfaction (Aladwani, 2002). Davis (1986) was a pioneer in this area, in his technology acceptance model (TAM). He identifies six key criteria for the success of any information system: system quality, information quality, usage, user satisfaction, individual and organisational impact (Tanoglu et al., 2010). The relationship between user-perceived performance and self-reported (perceived) user job satisfaction is multidimensional and comprises various aspects, such as user job, task and other aspects (Petter et al., 2013), and usage frequency (Yuan and Anol, 2014; Turner et al., 2010; Holden and Karsh, 2009).

There are many factors in the information technology environment that directly or indirectly affect user performance (Amoako-Gyampah, 2007), namely, the frequency of use of the system, the quality of the system, the quality of information, the system's usefulness, ease of use, task-technology fit, and user satisfaction. Moreover, the factors intention to use, user characteristics and task characteristics, are the most recurrent independent moderating variables that are reported to affect user performance (Davis, 1986).

While earlier research indicates that individuals with high computer anxiety exhibited lower self-confidence in their abilities and demonstrated poorer performance outcomes than subjects with low computer anxiety. It is also observed that computer anxiety is positively related to dissatisfaction with the computer system itself. In this respect, Cyert and March (1963) state that if an IS meets the requirements of the users, this will increase user satisfaction with the information system. On the other hand, if the IS does not provide the needed functionality, this will decrease user satisfaction with the system. Satisfaction as defined by Locke (1976) is an emotional response to an object. Similar definitions of satisfaction are proposed by different researchers. Ives et al. (1983) describe user satisfaction as the degree to which users believe the information system available to them, meets their informational requirements. Moreover, Bailey and Pearson (1983) define it as the feelings or attitude, both positive and negative, affecting the specific situation; whereas Doll and Torkzadeh (1988) define satisfaction as an effective attitude. Moreover, Galletta and Lederer (1989) conclude that both perceptions and attitudes are components of satisfaction. Melone (1990) on the other hand defines user attitude as the propensity to respond to a computer system, application, system staff member, or a process related to the use of the system. In retrospect, Pratkanis et al. (1988) suggest that satisfaction may be a function of the roles and tasks a person must perform in a given situation, whereas Pancer et al. (1992) postulate that user satisfaction may be altered by computer training since it is an attitude. Thus it remains to prove whether the effect existent, is direct, and in this case, its direction, or whether it is indirect, mediated or moderated by other factors, and what are these factors, their intensity and direction, if any. Thereby the researchers put forth the first hypothesis.

2.3 Is user job satisfaction

Organisations are always in a constant pursuit of maximising service and productivity (Rust and Huang, 2012). The Healthcare sector is not any different; the importance of this

sector lies in its massive effect on our society. Healthcare organisations rely heavily on the competence and productivity of their staff, especially those operating the information management systems (Sinha and Kurian, 2014; Flores et al., 2013; Venkatesh et al., 2003).

Employees in healthcare organisations need to be successfully operational, and this is achieved by integrating positive human and work elements, in order to achieve organisational goals, and to cover the requirements of daily tasks and activities among staff (Maamari and Chaanine, 2013). There is a positive relationship between job performance and job satisfaction that employees experience in their workplace (Sy et al., 2006). These employees working with information technology occupy a central role in modern healthcare in all countries (Boslaugh, 2013). Scholars reported that users of information technology are dissatisfied with their jobs and that this has always had a negative effect on healthcare organisation (Vaezi et al., 2016). With the Hospital Information systems (HIS) becoming an essential component of healthcare systems, HIS's main functions are to perform integrated collection of data, process, report and use essential data for the purpose of improving the efficacy and effectiveness of health services through efficient management of all levels (Bhartiya and Mehrotra, 2015; Saghaeiannejad-Isfahani et al., 2014), raising a new dilemma.

The available literature is divergent on the effect of HIS frequency of using the nurses and administrators' performance. According to Rosseter (2009), by the end of the year 2020, the shortage of nurses in the USA is estimated to exceed 500,000 nurses, whereas other scholars estimate this shortage to exceed one million (Dave et al., 2011; Keenan and Kennedy, 2003). In order to achieve retention and increase productivity, motivation and success, healthcare organisations need to look for solutions (Case et al., 2002). Many factors need to be examined and evaluated, especially those relating to the impact of IS. These systems play a key role in the healthcare employees' daily work (Nguyen et al., 2014). Improving performance and skills, and the enhancing the task and team performances, can be achieved through knowledge sharing and training (Wu et al., 2012). Moreover, knowledge sharing in many cases is found to be directly affected by the actual usage of the IS at work. However, according to Bakken (2006), even though the end-user satisfaction is positively increasing, yet no impact is reported as a result HIS implementation. Schutzman (1999) on the other hand, reports that implementing such a system improves work performance through perceived efficiency and perceived improved performance. Thus, HIS appears to be a solution for the problem of workload (Bates et al., 2001).

Many researchers believe in the importance of HIS and its impact on employees' job satisfaction. It falls as part of "*the relative importance of technical and managerial abilities for employees with different levels of authority*" (Wren and Bedeian, 2009, p. 216). Thus, the frequency of HIS usage has a great impact on every day's work, especially that it is reported that employees are directly affected by workload, overtime, lack of resources, and slow information workflow (Maamari and Chaanine, 2013). Moreover, Spector (1997) reports a positive relationship between workload, frustration and health symptoms that might motivate employees to leave their work. Although the age of users is negatively correlated with HIS adoption (Raghavan et al., 2015), the implementation of HIS inside healthcare facilities, leads to increasing the frequency of usage of the IS among employees. Many scholars studies dwell on the degree of job satisfaction of healthcare employees with a high frequency of interaction with and use of the HIS, and conclude that adapting to the HIS leads to employees' job satisfaction

(Kuzey, 2012; Landsbergis, 1988). The frequency of using the HIS is reported to have a direct effect, ranging from avoiding the system usage, to relying on it all the time (Simon et al., 2008). It is directly related to the TAM (Venkatesh et al., 2012). Furthermore, the frequency of HIS use is reported to have an impact on any relationship between IS success and employee job satisfaction (Petter et al., 2013).

Another factor that needs to be considered is user participation since it is important for organisational success. According to Wang-Cowham (2008), users that participate in the HIS development, show improved work performance, communication skills and overall job implementation. Therefore, participating in the development of a new IS is crucial for the success, working relationship, and the motivation of employees at the workplace. Mumford and Pettigrew (1979) state that user participation can be formal or informal, direct or indirect, and strong or weak. Allowing for user participation is a technique that proved to be successful in overcoming resistance to change (Cameron and Green, 2015; Carnall, 1986), since it increases user commitment to the HIS success.

2.4 perceived is quality

Whether the success of a HIS depends on the four variables of system quality, usage and user satisfaction, a positive culture, and information quality (Kivinen and Lammintakanen, 2013), or on system and information quality, and on individual and organisational impact (Sedera et al., 2004), its success leads to a higher usage frequency (Kivinen and Lammintakanen, 2013; Likert et al., 1999). A successful innovative HIS is a service quality enabler. Moreover, its success initiates more digitised routines (Davidson and Heineke, 2007) and a higher entrepreneurial spirit (Jelassi et al., 2014). Thus, perceived HIS quality is reported to motivate users toward higher usage and reliance on the system in capturing, storing and disseminating statistical information derived from medical records, monitoring key health indicators, managing facilities, taking measures, advancing research, and supporting decision-makers. Moreover, DeLone and McLean (2003) report that the HIS quality criteria, namely quality of the information, service quality, and user-interface design quality, determine the success of the system (DeLone and McLean, 2003).

In general, elements of system quality are often intermixed with concepts that are closely related to service quality and ease of use. In terms of service quality, Bailey and Pearson (1983) examined user satisfaction and included a variety of system dimensions that relate to information system services. They associate system quality with the operational measures of ease of use (Vaezi et al., 2016; Petter et al., 2013), or with perceived usefulness, perceived ease of use, and perceived enjoyment which lead to job satisfaction (Yan et al., 2013). Whereas for the IS users, they perceive it to be of high quality when it provides new and updated content in the layout and design, to meet their working requirements at different levels (Ward and Peppard, 2016). While these users perceive information quality as the quality of the content and the forms that the IS generates, measured in terms of accuracy, completeness, currency, efficiency, relevance, scope, and timeliness of information (Batini and Scannapieco, 2016; DeLone and McLean, 2003). Therefore it is obvious that the literature reports a number of components that make-up the quality of the HIS, but does not discuss the effect of the HIS on the relationship between the perceived performance of the HIS and the derived job satisfaction from that HIS usage, thus our second hypothesis.

3 Methodology

The importance of the three variables at hand in the healthcare sector is very high. Knowing that this economically vital area is continuously drained from its human resources, puts it in the highlights. The employee leakage due to early self-retirement, burn-out, travel, other more stable, less demanding and better-paid jobs, is a cause of concern to most healthcare administrators. Therefore, and in the hope of helping in identifying what leads to these employees' job satisfaction and retention, the researchers decided to dwell into the effect of performance on job satisfaction. The research questions under consideration ask whether perceived performance affects job satisfaction and whether HIS perceived quality moderates this relationship. These are hypothesised as follows (see Figure 1):

H_1: 'Perceived HIS Performance' leads to 'User Job Satisfaction'.

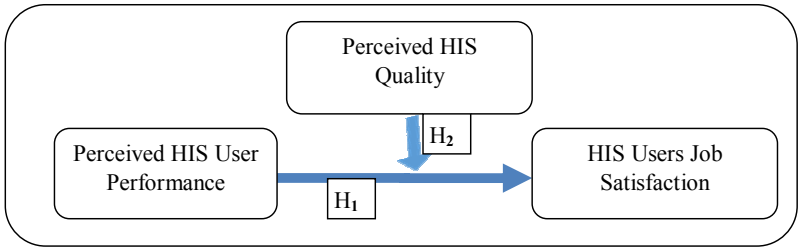
H_2: 'Perceived HIS Quality' moderates the relationship between 'Perceived HIS Performance' and 'HIS User Job Satisfaction'.

H_3: The moderated relationship of 'Perceived HIS Performance' and 'HIS User Job Satisfaction' is affected by 'Frequency of use' of the HIS.

Seeing the clear suggested model for study, the researchers move to the next step, namely that of defining the methodology to follow, and the field exercise to test the model's viability. The first step in this process scientific delimitation process is to define the research methods. First, the researchers, following Saunders et al.'s (2009) research layers, select the positivist philosophy in which the researcher takes a natural stance, observing and investigating reality. Second, they elect to use the deductive approach in which hypotheses are deduced and expressed explicitly, and data is collected to examine the specific outcome relating to the hypotheses at hand. Third, they opt for using the survey technique, which is popular in the field of business research, allowing direct primary data collection and analysis from a representative sample. Fourth, the researchers select the mixed method of quantitative research, qualitative through interviews) and quantitative to conduct a cross-sectional study in a new environment, namely Lebanon, where they collect and analyse their data.

In order to confirm and to short-list the variables to include in this study, the researchers conducted semi-structured interviews with seven healthcare administrators. These interviews are done in the administrators' offices at pre-arranged appointments, during the period of December 2015 to February 2016. The interviewees are all administrators (or administrative directors) who took part in the HIS preparatory and implementation stages. Their tenure in their current job in their respective healthcare facilities ranged between five and eight years. The result of these interviews shows that the variable 'Perceived HIS Performance' ranked the highest in the list of priority to investigate, for these managers. They unanimously believe that it affects their employees' performance and job satisfaction. The second variable that is mentioned by most (six out of seven) is how 'Perceived HIS Quality' affects the HIS users' usage and performance, and how these managers believe it results in better job satisfaction. As a result of the qualitative interviews, the researchers decided to focus their quantitative study on these two variables.

Figure 1 Suggested model to test (see online version for colours)



For the quantitative data analysis, and for the purpose of this study at hand, the researchers constructed a questionnaire composed of four sections. The first section includes an introduction to the study and its purpose, stressing on the anonymity of the responses and the voluntary participation; as well as a number of questions for capturing the demographic elements of the respondents. The questions ask about the respondents' gender, age, educational level attained, educational specialty, job rank (position), working experience in the healthcare sector, tenure in current healthcare organisation and frequency of HIS use. The second part of the questionnaire is composed of 11 measure scale items that measure the 'Perceived HIS Performance'. The subsections of this factor are labelled 'User Participation', 'Training' and 'Interaction'. The third part includes a set of questions that measure the respondents' job satisfaction. It comprises thirty-six scale items borrowed from Spector (1997), measuring nine facets of job satisfaction, namely Pay, Promotion, Supervision, Benefits, Contingent rewards, Procedures, Co-workers, Work, and Communication; including a number of reverse questions. The last part of the questionnaire includes a set of 15 questions that dwell on the respondents' 'Perceived HIS Quality', borrowed from Davis et al. (1989). TAM2 is used "*to provide an explanation of the determinants of computer acceptance that is general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations*" (Davis et al., 1989, p.985). This questionnaire tool measures responses on a 6 Likert-scale to avoid centrality and "*gives a wider range of possible scores and increases the statistical analysis that are available*" (Pallant, 2007, p.9) and slightly increases the accuracy of responses by 1–2% (O'Muircheartaigh et al., 2000), and are chosen by the researchers due to their ability to test the intended variables, their ease of use by respondents, and their respective validity and reliability.

The measure items used in the study are all proven tools used by many researchers. The face validity was analysed for assurance that the questionnaire measures the variables at hand. Moreover, the content validity is proven as the tools are borrowed from other scholars, and the construct validity of the 3 tools is ensured through the repetition of the data collection from a few respondents (8 in total) at a separate distant timing. Finally, criterion validity is reached as the results of the JSS survey are comparable to previous studies on IS users applied on the nursing sector (Maamari and Chaanine, 2013).

The responses vary from 1 = Disagree very much to 6 = Agree very much (with the statements).

The researchers planned their data collection process according to the population distribution of healthcare employees in the framework. They first collected detailed information on the distribution of the healthcare sector employment and the distribution of these employees over the geographic areas, along with the different rankings of the

healthcare institutions and their information technology development stages. The results first show that 90% of all healthcare employees are employed by categories A, B, C, and D of the Lebanese healthcare sector, as ranked by the Ministry of Public Health. The total private primary healthcare institutions in Lebanon is 130. Class A includes the academic hospitals that have more than 200 beds, B the tertiary hospitals that operate 75–100 beds, C the smaller general hospitals, D the specialised hospitals, E the small and rural hospitals and F for the failing ones (www.databank.com.lb). Moreover, the field data shows that hospitals classified as A and or B enjoy healthcare information systems at are far more developed and better maintained and upgraded than those in the remaining. Therefore, the researchers decide to collect the data only in classes A and B hospitals, where the total employment is 69% of the total population of 21,400 (Syndicate of Private Hospitals in Lebanon, 2016). All these institutions have and are using developed Healthcare Information Systems. For this purpose, and for representativeness, they plan to survey six healthcare institutions of class A, and 14 on Class B. The class A ones are all in the capital and demographic centre, while class B is distributed in six geographical locations (districts), four in the capital and two from each remaining area.

For the validation of the scale, the researcher followed Churchill's Paradigm (1979) eight steps. Following the lead of Okpara (2004), the self-administered questionnaire was pilot-tested in one institution, with 13 employees, where the researchers have easy access to the administration and are therefore able to acquire quick administrative consent. The results of the pilot-test prove the need to translate the questionnaire into the French language, as a large number of respondents have higher proficiency in French than in the English language. The measure tool is professionally translated and reverse translated to guarantee accuracy and meaning.

The next step in the process is the data collection. For this purpose, the researchers established contacts to reach a number of healthcare institutions for sampling purposes during May 2016. They were able to secure the necessary approvals and assistance through the human resources departments. The data collection process was done between May and August 2016, at random in the selected organisations, on the set dates for data collection at the different facilities, to avoid sampling bias. The researchers distributed the hard-copies of the questionnaires to the first employees they met in the corridors and workstations in the facilities on those visits, to a total of 860 copies to increase the chances of capturing perception (Epp and Arnold, 2006) and is considered suitable for data accuracy (Griffin and Hauser, 1993). These were distributed as follows, 50 in each class A and 40 in each class B healthcare institution. The respondents were asked to keep their responses anonymous, and to deliver them by the end of their work-shifts to a collection box placed outside the entrance of the human resources office. The researchers passed by those locations at the end of the day to collect the available responses. The turnout was 291 responses (33.84%). The received responses were entered into Excel by the researchers themselves to control for data entry quality. Then the nineteen reversed questions of Spector's (1997) Job Satisfaction Survey are handled, and the data transferred to SPSS 23.In the process to purify the data, nine responses were cancelled for errors and omissions, leaving the researchers with 282 usable responses (see Table 1). The descriptive statistics of the actual respondents shows that their distribution comes close to that of the population, where the population includes 23.01% males, the sampled or targeted population included 31.64% males, and the actual usable responses include 25.17% males, reflecting a high the sample representativeness.

Table 1 Population and sample

	Population		*Sampled population*		*Responses received*	
Gender	*Employees*	*Percentage* (%)	*Employees*	*Percentage* (%)	*Employees*	*Percentage* (%)
Males	4925	23.01	272	31.63	71	25.17
Females	16,478	76.99	588	68.37	211	74.82
Totals	21,405	100.0	860	100.0		

The collected data was analysed for distribution consistency, reliability, and validity. These analytical tools show that data skewness was acceptable (ranging between –0.246 and –0.001), whereas Kurtosis ranges between –0.609 and 1.575 and is considered acceptable. Moreover, the Cronbach's alpha reflects a high internal consistency of the data, it ranges between 0.791 and 0.893, where a value above 0.7 is considered adequate, and the result of the KMO test range between 0.719 and 0.892, whereas values above 0.6 are acceptable. Furthermore, Bartlett's Sphericity test is significant at 0.000, showing high validity. The results show that the measure is adequate (see Table 2) and acceptable for measuring the variables at hand. Finally, the validity of the measure is established for convergent, content, criterion, and construct through the many different steps involved in the careful preparation of the tool, its revision and pilot, and review by professional colleagues.

Table 2 Skewness and kurtosis results of the variables in the model

Variable	*Skewness*	*Kurtosis*	*Cronbach's alpha*	*KMO*	*Bartlett's sphericity*
Perceived quality of work life	–0.167	–0.207	0.839	0.719	0.000
Perceived healthcare IS user performance	–0.001	–0.609	0.791	0.781	0.000
Job satisfaction	–0.246	1.575	0.893	0.892	0.000

4 Results and analysis

Once the validity and reliability of the measure are established, the researchers analysed the data collected using the measure tool designed for this study. These results describe first the demographic variables, then second the correlations among the variables, third the regressions and hypotheses testing.

The results of the study from testing the model at hand are summarised here-below. These results include analyses for correlations, and regressions, using SPSS 23.0. First, the analysis of the correlations among the variables at hand show that tenure in the current healthcare facility is positively strongly correlated with both age ($r = 0.607$; Sig. = 0.000; 2-tailed), and with years of experience($r = 827$; Sig. = 0.000; 2-tailed), revealing a trend that the older generation has lower tendency to move or change jobs. This could be explained by management theory as a sign of stability, commitment or loyalty leading to tenure, or as a sign of job satisfaction resulting in the majority of the

employees retaining their positions within these healthcare institutions. Second, the factor employee perception of information system quality is weakly positively correlated with education specialty of the respondent ($r = 137$; Sig. = 0.021; 2-tailed); which shows that there is little impact of what educational background the respondents carry on their satisfaction derived from the quality of IS system, as long as it serves the purpose properly. Moreover, the factor employee perception of information system quality is moderately positively correlated with Perceived Healthcare IS User performance ($r = 514$; Sig. = 0.000; 2-tailed); which supports the first hypothesis. This shows that the respondents working with the IS in the healthcare facilities do consider the performance of an IS as directly related to its quality of performance, knowing that the majority of the respondents are nurses by career, which supports the second hypothesis. Finally, the IS User Job Satisfaction is shown to be weakly positively correlated with years of work experience of the respondents ($r = 161$; Sig. = 0.007; 2-tailed) and their tenure in the current healthcare facility ($r = 151$; Sig. = 0.011; 2-tailed); and with Perceived IS User performance ($r = 180$; Sig. = 0.002; 2-tailed). Thus, the respondents consider the IS as part of their job satisfaction package to some extent.

To analyse for the moderation effect of the variable 'HIS Quality', a product is created by multiplying 'Perceived HIS User Performance' by the moderator 'Perceived HIS Quality'. The results of regression analysis of the data at hand show that the introduction of the moderator to the formula did not enhance the relationship effectively as expected by the researchers. The effect of the moderation (ΔR^2) is only 0.007 (see Table 3). Therefore, the researchers attempt to look further into the relationship.

Table 3 Results of regression of the proposed model

	Step 1				*Step 2*			
Variables	*B*	*SE*	*β*	*Sig.*	*B*	*SE*	*β*	*Sig.*
Intercept	124.207	6.833		0.000	152.704	26.636		0.000
HIS perceived user performance	0.702	0.231	0.208	0.003	–0.771	1.350	–0.228	0.569
Perceived HIS perceived quality	–0.091	0.116	–0.054	0.433	–0.513	0.399	–0.302	0.199
	Performance × Quality				0.021	0.019	0.606	0.269

R^2 Step 1 = 0.032, R^2 Step 2 = 0.039, $\Delta R^2 = 0.007$, $p < 0.05$.

The researchers split the data by frequency of use in order to be able to see whether any of the three user categories of frequency of use can be singled out. The data is split using the question 'Number of daily hours spent using the IS at work' and where the answers are '1 = 0–1 h a day', '2 = More than 1 and less than 3 h a day'; and '3 = More than 3 h a day'. The results of the correlation analysis ensuing from this data split are as follows (see Table 4). These results show that those employees using the HIS the least (up to 1 h per day) have more consistent responses (higher level of significant) that the remaining groups with respect to job satisfaction.

Table 4 Highlights of correlation differences among users

		0–1 hour/day		*1 < x < 3 hours/day*		*<3 h/day*	
		R	*Sig.*	*R*	*Sig.*	*R*	*Sig.*
Tenure current healthcare	Age	0.456	0.001	0.652	0.000	0.599	0.000
	Work exp.	0.819	0.000	0.800	0.000	0.848	0.000
Perceived HIS user performance	Age	0.397	0.006	–0.074*	0.428	0.017	0.854
	Educ.	0.316	0.030	0.020	0.833	0.029	0.753
	Tenure	0.300	0.041	–0.023*	0.809	–0.053	0.562
JSS	Educ.	–0.002	0.991	0.047	0.613*	0.175	0.056
	Work exp.	0.090	0.548	0.034	0.716*	0.249	0.006
	Tenure	0.196	0.187	0.013	0.892*	0.224	0.014
	HIS user perf.	0.324	0.026	0.044	0.637*	0.249	0.006

*$p < 0.01$.

Once the user categories are defined and clearly different, the researchers ran the regression analyses using SPSS 23.0, for every one of the subcategories of the HIT users to test for the moderating effects of the suggested variables in the model. The first regression test done was for the low HIT user frequency (see Table 5). The results for these low-frequency users show that the change in the variance explained by the regression of HIS user perceived job satisfaction on perceived HIS user performance, as a result of introducing the moderator perceived HIS quality, is 4.8% ($p < 0.05$).

Table 5 Results of regression of the proposed model – HIS usage frequency 0–1 hour daily

User frequency = 0–1 hour daily	*Step 1*				*Step 2*			
	B	*SE*	*B*	*Sig.*	*b*	*SE*	*β*	*Sig.*
Intercept	96.818	17.165		0.000	202.654	73.797		0.009
Perceived user performance	0.077	0.550	0.286	0.082	–3.909	3.361	–1.144	0.251
Perceived quality	0.147	0.289	0.082	0.614	–1.485	1.144	–0.825	0.201
Performance × Quality					0.074	0.050	2.030	0.148

R^2 Step 1 = 0.105, R^2 Step 2 = 0.153, $\Delta R^2 = 0.048$ $p < 0.05$.

The second regression test done was for the moderate HIT user frequency (see Table 6 below). The results for these moderate frequency users show that the change in the variance explained by the regression of HIS user perceived job satisfaction on perceived HIS user performance, as a result of introducing the moderator perceived HIS quality, is 6.6% ($p < 0.05$).

The last regression test done was for the high HIT user frequency (see Table 7). The results for these low frequency users show that the change in the variance explained by the regression of HIS user perceived job satisfaction on perceived HIS user performance, as a result of introducing the moderator perceived HIS quality, is low at 1.8% ($p < 0.05$).

Table 6 Results of regression of the proposed model – HIS usage frequency 1–3 hours daily

User frequency = 1 < x < 3 h daily	*Step 1*				*Step 2*			
	B	*SE*	*β*	*Sig.*	*b*	*SE*	*β*	*Sig.*
Intercept	145.571	0.000		0.000	76.731	37.823		0.045
Perceived user performance	0.642	0.082	0.189	0.106	4.520	2.097	1.328	0.033
Perceived quality	–0.378	0.614	–0.239	0.041	0.656	0.578	0.415	0.259
Performance × Quality					–0.057	0.030	–1.630	0.062

R^2 Step 1 = 0.002, R^2 Step 2 = 0.068, $\Delta R^2 = 0.066$ $p < 0.05$.

Table 7 Results of regression of the proposed model – HIS usage frequency more than 3 hours daily

User frequency = <3 h daily	*Step 1*				*Step 2*			
	B	*SE*	*β*	*Sig.*	*B*	*SE*	*β*	*Sig.*
Intercept	114.731	11.557		0.000	188.264	50.841		0.000
Perceived user performance	0.829	0.332	0.244	0.014	–2.762	2.441	–0.814	0.260
Perceived quality	0.024	0.178	0.013	0.893	–1.015	0.722	–0.558	0.162
Performance × Quality					0.050	0.034	1.400	0.140

R^2 Step 1 = 0.062, R^2 Step 2 = 0.080, $\Delta R^2 = 0.018$ $p < 0.05$.

The regression results with the data split by the frequency of HIS use shows that there is a difference in the effect of the HIS Quality's effect on the relationship of 'HIS Perceived User Job Satisfaction' with 'Perceived HIS User Performance', thus confirming the third put forth hypothesis (H_3). For those employees who use the system the least, perceived HIS quality moderates their perceived performance-job satisfaction to a moderate extent. The introduction of the moderator (Perceived HIS Quality) strengthens the relationship by 4.8%. As for the moderate users of the HIS (those who use it 1–3 h per day), the introduction of the moderator variable strengthens the relationship by 6.6%. However, for the heavy users of the HIS (more than 3 h a day), the introduction of the moderator variable strengthens the relationship by only 1.8%. This slight increase effect could be due to the habits building and the learning curve factor derived from the long hours of work using the HIS. Through excessive use, the user tends to create shortcuts, routines, or to simply memorise the steps of a procedure in a job, and where the job is routine in nature, the user develops a mechanical attitude toward using the system and stops evaluating or assessing its features. By this, the user develops a comfort zone around the system. Thus the results show that the perceived quality of the HIS is perceived to have higher importance for those users whose work duties do not require them to use the system extensively.

The researchers, and for further analysis, run a Confirmatory Factor Analysis (structural equation modelling – SEM) using AMOS 20's maximum likelihood estimation and reliability test for scale validation and the model fit. The results test the significance and strength of the relationships among respondents for the aggregate sample. The researchers took into consideration the presence of correlations, covariance and regression among the model's different variables. After plotting the path diagram (see Figure 2), the results show a high significance among these variables (Sig. = 0.000), which is partially in line but not matching with the result of the SPSS conducted above. Moreover, testing the model for its goodness of fit, the results need to show the following. First, the comparative fit index (CFI) required to be above 0.90; the second is root mean square error of approximation (RMSEA) that should be 0.1 or smaller; the third is the standardised root mean residual (SRMR) required to be 0.08 or smaller (see Table 8). AMOS results show an acceptable value for the CFI equal to 0.923 whereas the RMSEA is equal to 0.041, while the SRMR is 0.086. Hence we conclude that we have an acceptable low-level goodness of fit in the model. Moreover, the PCLOSE result is high at 0.021(see Table 9), and only the TLI index value is 0.89, which is lower than 0.9. The significance values' output is P = 0.000 that is <0.05 which is acceptable. Moreover, the various good of fit (GFI is 0.834). Thus, the researchers conclude through AMOS that the relationship among the variables is acceptable, and all the variables contribute to the explanation of the dependent variable, whereas the moderating role of the variable 'HIS Quality' is not strong.

Finally, plotting the results using AMOS, the postings for the independent (Perceived HIS Performance) and dependent (HIS User Job Satisfaction) variables do not change when we introduce the moderator factor Perceived HIS Quality (see Figure 2).

Figure 2 Structural equation modelling – model fit (see online version for colours)

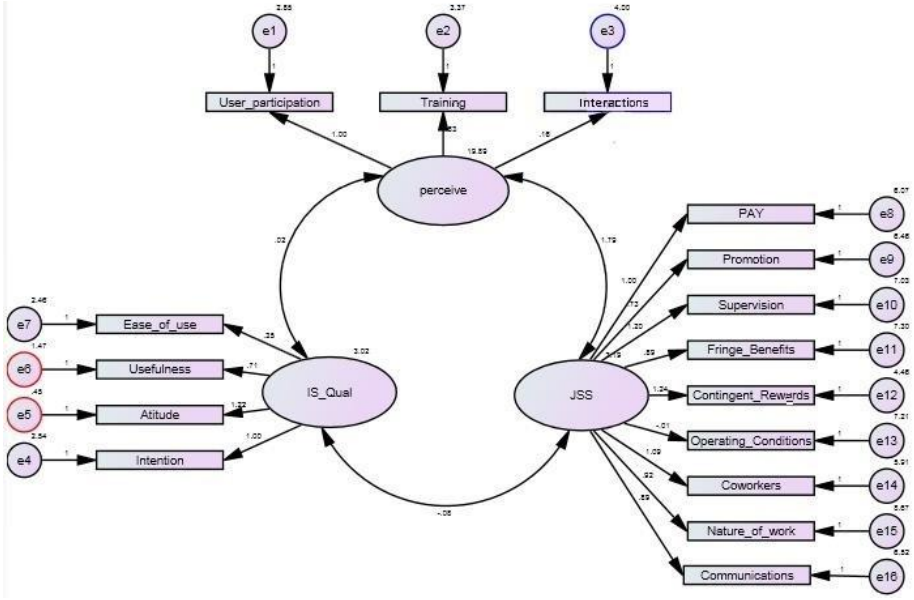


Table 8 AMOS results – significance

Model	*P*	*CMIN/DF*
Default model	0.000	3.477
Saturated model		
Independent model	0.000	12.779

Table 9 AMOS results – RMSEA

RMSEA	*RMSEA*	*LO 90*	*PCLOSE*
Default model	0.041	0.083	0.000
Independent model	0.104	0.095	0.000

5 Implications, limitations and conclusions

If managers of HIS and healthcare facilities want to improve the job satisfaction level of their team members, they first need to put efforts into retaining staff members. Tenure creates stability which in turn is related to job satisfaction, decreasing employees' leakage and early self-retirement, irrespective of educational background and specialisation. Second, these managers need to publicise the quality of the HIS through different venues and opportunities, such as word of mouth, and demonstrations. A perceived high-quality HIS is correlated with higher use for two categories of users. This would encourage more usage and improve both perceived and actual performance within a positive organisational culture, to decrease the psychological burn-out of HIS users. Moreover, a well used HIS can help make many jobs in the healthcare field less demanding. Third, HIS and healthcare facilities' managers need to encourage the moderate and high-frequency users to increase their trust and feeling at ease with the system, through training sessions, manuals provided, and technical support at need. This would boost employees' confidence and reliance on the system, and thereby improving the tendency to use the HIS. As a result, the healthcare institution can reap the benefits from the capital invested in the HIS. Finally, these healthcare facilities can build internal marketing programs to boost employees' perception of the system's quality and use.

The researchers suggest for future research to further investigate the different categories of IS users by gender and age. Further studies may be able to spot important notions and findings from the introduction of other variables into the model tested. These variables may include user participation in the business requirement analysis, and the level of integration of the HIS functional activities (by the patient) on users' job facilitation and change in job description.

The study's limitations include the selection of the administrators. The researchers needed to interview managers with a certain level of tenure, being exposed to the healthcare facilities' operation before and after the HIS implementation. The result was a shortlisted 32 administrators. The researchers randomly interviewed those willing to receive them. However, the researchers believe that many others may have diverting opinions and novel suggestions. Thus the researchers recommend a broader qualitative investigation for interviews. Moreover, although the sample size is adequate for this

study, the researchers were hoping for a larger response in order to dwell deeper into the different demographic subcategories for deeper insights.

As a conclusion, this field exercise is adding a small brick to the pool of knowledge on the HIS user job satisfaction. It highlights a facet that is of interest to many administrative and human resources managers. More specifically it showcases a difference in perspective between our IT/IS consideration of what HIS performance and quality are and what users perceive them to be or to include. The results clearly reveal a certain impact on the perceived quality on the different age-groups of users, as well as a certain effect of perceived performance on job satisfaction, but also leave room for further analysis as to the relevance of macroeconomic factors o HIS adoption (Raghavan et al., 2015).

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