The Impacts of Changing of Mandatory Information Systems on the End-User Satisfaction

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Abstract— **This research aims to understand the impact of changing of multiple separated IS's by one integrated IS on the End-user satisfaction as a surrogate to IS success. The proposed research model uses a combined approach deals with the new IS implementation as an organizational change based on change management effectiveness, user readiness for change, user resistance to change and Individual-related change self efficacy from one side and as technological innovation based on information quality, system quality and service quality from the other side. Data collected from a longitudinal field survey before, during and after a new IS implementation are analyzed to test the proposed hypotheses. The results indicate that End-user overall satisfaction is strongly influenced by change management, user readiness for change and IS quality factors during and post the implementation. The study draws attention to the role change management has in building user readiness, reduce change resistance, increase change self efficacy to increase End-user overall satisfaction of the new IS. Also, the important roles of quality factors of the new IS which depend on the significant contribution of information quality, system quality and service quality on the End-user overall satisfaction of the new information system especially, system quality during implementation and service quality after the implementation. The study contributes to the IS literature by providing a new perspective that complements the extant IS adoption as well as change management and IS quality research.**

Keywords-change management; End-user satisfaction; IS implementation; organizational change; IS success; IS quality

I. INTRODUCTION

It is important to achieve successful implementation when investing in a change to a new information system. Management must manage the change process to successfully integrate the new information system into the organization [1] [2]. The new information system implementation must be managed both as a technological innovation so the new IS quality factors should be considered from one side and as an organizational change so change management strategies should be taken into consideration from the other side. End-user overall satisfaction with the old IS is another important aspect as users compare the new system to the old one it replaces and evaluate change for the expected outcome and then decide to either react favorably or resist [3] which makes factors as user readiness for change, user resistance to change, change self efficacy, Information quality, System quality and service quality should be examined for their impacts on End-user overall satisfaction with the new IS. Change strategies that can overcome resistance, create readiness and increase individual-related change self efficacy combined with increasing IS quality will assist in successful implementation [2] [4] [5].

This research measures the end-user overall satisfaction with the old IS (SAT1) pre implementation of the new IS and then investigates the relationships among (SAT1), users' perceptions of change management effectiveness (CM), user readiness to change (REA), user resistance to change (RST), Individual-related Change self efficacy (SLF), Information quality (IQ), System quality (SQ), Service quality (SRVQ) and End-user overall satisfaction with the new IS (SAT2) / (SAT3) at two points in time which are during and after an IS implementation.

Although much research has been conducted on CM, REA, RST, SLF, SAT and their respective relationship with one another. There are very rare researches which have looked closely inside the change management process and examined their relationship longitudinally. Reference [2] is the only relevant longitudinal study; however, it has focused only on (CM, REA, RST and EUCS). End-user computer satisfaction "EUCS" [6] [7] focuses on five physical IS attributes (content, format, accuracy, ease of use, and timeliness) that influence user satisfaction with a system, while confirmatory studies of the EUCS instrument have provided evidence of good reliability and validity, this instrument only includes measures of the technical qualities and capabilities of a system (IQ & SQ). In a review of the user satisfaction construct, [8] notes that measuring a user's attitude (satisfaction) toward a system based only upon system attributes can offer a distorted view of the user's perceptions. [2] also, has used a resistance to change measurement tool which has neglected the reference to which Information system is used at the time of measurement (the old IS or the new IS) which result in an opposite relationship in the post adoption phase between change management and users resistance of change.

This research focuses only on the mandatory use of IS, and argues that end-user overall satisfaction of the information

system (SAT) is better than EUCS because it represents a summative judgment regarding the end-user interaction with the new IS from the organizational change perspective and from the technological innovation effectiveness and it is also a better measure for true technology acceptance in mandatory settings rather than use intention and actual use. In mandatory settings, use intention can be influenced by compliance requirements [1] and the actual use depends on the role, needs, and the proficiency of the user. Therefore, end-user overall satisfaction with the system is a better indication of the system success than use intention and actual use. In this study, the following research questions will be examined:

What are the impacts of changing of a mandatory IS on the satisfaction of End-Users?

What are the individual and combined influences of information quality, system quality and service quality on the overall satisfaction of the new IS during and post the implementation?

II. Theoretical Development

A. Research Model

Figure 1 presents research model. Change Management and IS quality dimensions are critical to the success of IS implementations. It is important to understand the effect of change management on creating end-user readiness, increasing individual related change efficacy and overcoming user resistance to change in order to improve End-user overall satisfaction, this should be accompanied by studying the impact of IS quality dimensions which include Information Quality, System Quality and Service Quality in enhancing end-user overall satisfaction of the new information system.

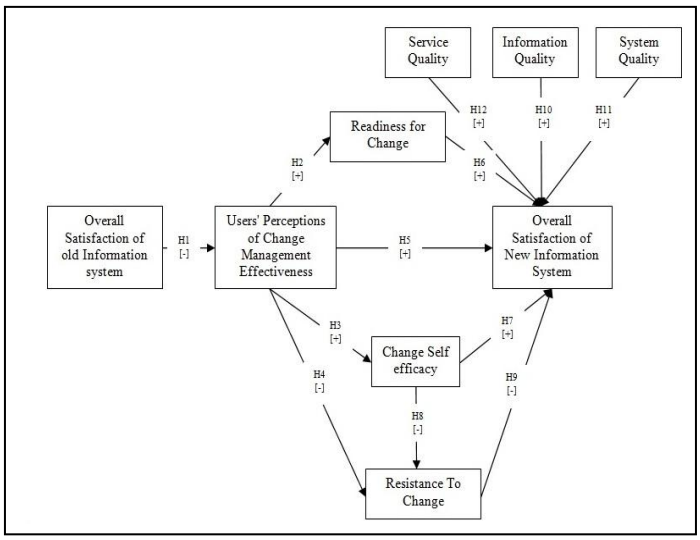


Figure 1. Research model

End-user overall satisfaction of the old system is expected to negatively affect the users' perception of change management effectiveness for the new system. Perception of change management effectiveness is expected to positively impact user readiness for change, Individual-related change self efficacy and end-user overall satisfaction of the new system but negatively impact resistance to change. Readiness for change and individual-related change self efficacy are expected to positively impact end-user overall satisfaction with the new system, whereas resistance to change is expected to negatively influence satisfaction. Individual-related change self efficacy is expected to negatively impact resistance to change. Information quality, System quality and service quality are expected to positively impact end-user overall satisfaction.

1) Change Management

Management should dynamically use strategies and techniques to introduce and facilitate an organizational change. Change management must motivate employees by creating a work climate that satisfies basic psychological needs to enhance intrinsic motivation. A person acts to achieve a desired, or to avoid an undesired, consequence [9]. In order to manage change effectively, information must be shared with employees and employees' concerns must be addressed as they surface [10]. Providing a meaningful rationale for doing the task, acknowledging that people might not find the activity interesting, and emphasizing choice rather than control, are change management strategies that promote internalization and satisfaction [11] [12]. Empathy and concern, two elements of communication, are also conducive to satisfaction of organizational change and apply to change management during information systems implementations as well [13] [12] [14]. This research explores the users' perceptions of change management effectiveness (CM). The CM construct is an evaluative response representing the users' perception of how effectively management has employed the strategies involving communication, support, fairness, resources availability, and training [2].

2) Readiness for change

Reference [15] defines readiness for change as a comprehensive attitude that is influenced simultaneously by the content (i.e., what is being changed), the process (i.e., how the change is being implemented), the context (i.e., circumstances under which the change is occurring), and the individuals (i.e., characteristics of those being asked to change) involved. Furthermore, readiness collectively reflects the extent to which an individual or individuals are cognitively and emotionally inclined to accept, embrace, and adopt a particular plan to purposefully alter the status quo. Also, it classified the readiness for change into five themes: Self efficacy (confident that the user himself is capable of making the change), Personal valence (confident that the change will benefit the employee personally), Senior leader support (recognition that the organization's leadership supports the change), Organizational valence (confident that the change will lead to long-term benefits for the organization) and Discrepancy (recognition for the need for change), where content (i.e., organizational valence), process (i.e., management support), context (i.e., discrepancy), and individual attributes (i.e., self-efficacy and personal valence) were represented. In our research model individual-related self efficacy is dealt as a separate construct to study its effect on the resistance to change [16].

3) Individual-Related change efficacy

Employees may be less apt to accept and participate in changes when they involve the use of new technology, and employees have uncertainty about whether or not they will be able to perform their roles with the new programs or systems [17]. When employees believe that they will not have the ability to perform after imposed change, they may be more likely to resist it [18]. Self-efficacy is defined as an individual's judgment of their capacity to perform in a given situation [19]. Self-efficacy is thought to determine motivational behaviors such as goals, effort, and persistence [20]. This is particularly true when the situation in question is novel or uncertain in nature [21].

4) Resistance to change

[22] cited resistance to change as a contributing factor to high failure rates of new information systems implementations. Resistance has been defined as any conduct that tries to keep the status quo, i.e., resistance is equivalent to inertia, as the persistence to avoid change [23]. [24] defines it as an individual's tendency to resist or avoid making changes, to devalue change generally, and to find change aversive across diverse contexts and types of change. This study adopts the definition of resistance as an opposition to the change engendered by the expected adverse consequences of the change [25]. Negative behaviors are related to resistance, which can occur at any stage in implementation [26]. Innate resistance to change, lack of involvement in the change process, lack of management support, poor IS quality, and the lack of designer-user interaction have all been identified as factors causing resistance [27].

5) Information Quality

It is related to the quality of information system outputs and it can be described in terms of outputs that are useful for users, relevant for operational tasks or decision making, and easy-to-understand (representing IS quality as value) as well as outputs that meet users' information specifications (representing IS quality as conformance to specification). In all organizations, information is an important resource that can be used to sustain their competitive advantage [28]. The study of information quality is prevalent in IS [29] [30] [31] [32] [33] [34]. Measuring information quality has never been easy as there are different views of what information quality consists of and how it should be measured [35].

6) System Quality

It represents the quality of information processing itself, which is characterized by employment of state-of-the-art technology, a system offering key functions and features (denoted as IS excellence), and software that is user friendly, easy to learn, and easily maintainable (denoted as IS value). Due to the technical focus of system quality, it has received less attention than constructs such as information quality, user satisfaction, etc. in the IS management literature [36]. Conceptualizations of system quality among existing IS studies also vary. From the systems development perspective, system quality was "largely conceptualized as an intrinsic attribute of the software" [36]. From the IS user perspective, system quality represent some aspect of a system that can provide benefits to an organization [37]. A variety assortment of system quality measures have been set forth [32] [38] [39] [40]. Measurement of system quality has centered on assessment of hardware, software, and resource utilization [41]. Assessment of hardware includes measures such as response time, ease of use [39], system flexibility [38], etc. Assessment of software includes measures such as "portability, reliability, efficiency, human engineering, and maintainability" were used to represent different dimensions.

7) Service Quality

It is defined as the level of service delivered by IS/IT employees to end users (as compared to their expectations) in terms of dimensions such as reliability, responsiveness, assurance, empathy ...etc.. These concepts of IS service quality are reflected through IS meeting user expectations (by satisfying IS users by providing services to users at the time promised, building confidence in IS users, and being courteous to users when dealing with service requests) and demonstrating IS excellence (by having highly knowledgeable IS experts and by ensuring ''error-free" performance). In organizations, the successful use or adoption of an IS often depends on the quality of service provided by IS department. Therefore, the quality of service has been examined extensively in many IS studies [42].

Very few previous IS studies have examined service quality in the presence of the information quality and system quality. This research will study the impact of the three dimensions of IS quality on the end-user overall satisfaction.

8) End-user Overall Satisfaction

IS benefits are sometimes intangible, and hence, end-user satisfaction is utilized as a surrogate measure of IS performance [42] [43]. A survey of management's sensitivities to user needs, participation, and communication is often used to examine satisfaction as a measure of how well the change is being managed [44]. Past definitions of user satisfaction have included "felt need," "system acceptance," "perceived usefulness," "MIS appreciation," "feelings" about a system [45] and, more generally, "attitudes and perceptions." Specific definitions for the related constructs range from the "extent to which users believe the information system available to them meets their information requirements" [45] to the "manifold of beliefs about the relative value of the MIS" [39]. These definitions have some form of evaluative response in common [8]. In this study, End-user overall satisfaction represents a summative judgment of the end-user regarding his interaction with the new IS from the organizational change perspective and from the technological innovation effectiveness.

B. Research hypotheses

Table I shows the research hypotheses used in this study. It is assumed that users who are already satisfied with the old IS will not be motivated to use a different IS, these users will be less collaborative in the change process. Also, users that are well prepared for the change through effective CM will have minimum dissonance between their expected benefits and realized benefits i.e. creating readiness will have a positive

TABLE I. RESEARCH HYPOTHESES

Hypotheses		Path & Relationship
H1a	Overall satisfaction of the old information system negatively affects the users' perceptions of change management effectiveness for the new information system during implementation	(-) SAT1 -----> CM2
H1b	Overall satisfaction of the old information system negatively affects the users' perceptions of change management effectiveness for the new information system post implementation	(-) SAT1 -----> CM3
H2a	Users' perceptions of change management effectiveness positively affect readiness for change during implementation	(+) CM2 -----> REA2
H2b	Users' perceptions of change management effectiveness positively affect readiness for change post implementation	(+) CM3 -----> REA3
H3a	Users' perceptions of change management effectiveness positively affect change self efficacy during implementation	(+) CM2 -----> SLF2
H3b	Users' perceptions of change management effectiveness positively affect change self efficacy post implementation	(+) CM3 -----> SLF3
H4a	Users' perceptions of change management effectiveness negatively affect resistance to change during implementation	(-) CM2 -----> RES2
H4b	Users' perceptions of change management effectiveness negatively affect resistance to change post implementation	(-) CM3 -----> RES3
H5a	Users' perceptions of change management effectiveness positively affect overall satisfaction of the new information system during implementation	(+) CM2 -----> SAT2
H5b	Users' perceptions of change management effectiveness positively affect overall satisfaction of the new information system post implementation	(+) CM3 -----> SAT3
H6a	Readiness for change positively affects overall satisfaction of the new information system during implementation	(+) REA2 -----> SAT2
H6b	Readiness for change positively affects overall satisfaction of the new information system post implementation	(+) REA3 ------> SAT3
H7a	Change self efficacy positively affect overall satisfaction of the new information system during implementation	(+) SLF2 -----> SAT2
H7b	Change self efficacy positively affect overall satisfaction of the new information system post implementation	(+) SLF3 -----> SAT3
H8a	Change self efficacy negatively affect resistance to change during implementation.	(-) SLF2 -----> RES2
H8b	Change self efficacy negatively affect resistance to change post implementation	(-) SLF3 -----> RES3
H9a	Resistance to change negatively affects overall satisfaction of the new information system during implementation	(-) RES2 -----> SAT2
H9b	Resistance to change negatively affects overall satisfaction of the new information system post implementation	(-) RES3 -----> SAT3
H10a	Information quality positively affects overall satisfaction of the new information system during implementation	(+) IQ2 -----> SAT2
H10b	Information quality positively affects overall satisfaction of the new information system post implementation	(+) IQ3 -----> SAT3
H11a	System Quality positively affects overall satisfaction of the new information system during implementation	(+) SQ2 -----> SAT2
H11b	System Quality positively affects overall satisfaction of the new information system post implementation	(+) SQ3 -----> SAT3
H12a	Service Quality positively affects overall satisfaction of the new information system during implementation.	(+) SRVQ2 -----> SAT2
H12b	Service Quality positively affects overall satisfaction of the new information system post implementation	(+) SRVQ3 -----> SAT3
H13	Overall satisfaction of the new system during implementation positively affects Users' perceptions of change management effectiveness post implementation.	(+) SAT2 -----> CM3

effect on perceived usefulness and ease of use which should increase user satisfaction as an indication of a successful implementation. While Poor change management strategies would indicate a negative opinion of its effectiveness, which increase user resistance. More resistance deters internalization of the benefits of change and reduces satisfaction with the change. A change management should take into consideration the users' attitudes towards the new IS during implementation and adjust their change management strategies accordingly.

The difficulties faced during IS change can be viewed by users as challenges to be mastered or threats to be avoided depending on their self-efficacy. End-users who have high self-efficacy for the change will be more likely to commit to making the change a success while users with a low level of self-efficacy feel discouraged and may be more inclined to resist the change. Also, when users are highly perceived information quality, system quality and service quality, they are more likely to be satisfied with the new IS.

III. METHODOLOGY

A. Data Collection

The research design is a longitudinal study with surveys at three points in time at Pre, during and post IS implementation. At each point it is a cross-sectional study using a survey. The research setting is in Suez canal Authority transit department replacing six separated information systems with a new integrated mandatory use information system. The new information system serves to manage all functions that was provided by the old separated information systems in Transit department. Also, it includes stand-alone software packages and other software to conduct business functions of transit department of Suez canal. An additional comment area was added to the end of the surveys during and post the implementation: "Please comment on any job tasks that have improved or worsened with the change." as in [2]. Data were collected at three times at Pre-implementation (November 2012, referred as time 1) when the decision of a new system was made, no modules of the new system were introduced, and the old system was in use; then during-implementation (January 2014, referred as time 2) after the key system components were implemented and in use; and at the end, Post-implementation (May 2014, referred as time 3) after the entire new system was implemented and in operation for a month. When new modules were implemented, the parallel modules in the old system were completely displaced and taken offline. By Time 3, all modules and integration were complete and the old information system functions were completely displaced. Issues identified by the survey comments were forwarded to management as input for adapting change management strategies. Communications from the management, comments on improved workflow enabled by the new IS system, priority changes, or other issues indicated in the survey comments were collected as qualitative data.

At time 1, survey questionnaire one was sent by email to all the population of end-users. A note at the beginning of the survey explained the purpose of the study and the procedure for handling the data. It was emphasized that the data would be kept confidential and used only for research purposes. Follow-up emails were sent to maximize the response rates. To track respondents, each survey was assigned a unique code and respondents did not need to provide their identities on the survey. A list of codes linking the survey to the email addresses was created to which only the researcher had access.

The population size was 240 end-users, the respondents of a completed survey questionnaire one were 203 end-users. At Time 2, survey questionnaire two was sent to the 203 employees from them only 196 returned a completed survey. Survey questionnaire three at time 3 was sent to the 196 employees, from which 192 end-user completed the survey.

The partial Least Squares (PLS) testing used in the analysis of the research model requires the same number of cases at each point in time in order to test the common model simultaneously. We eliminate respondents from time 1 and time 2 who are not responded to survey questionnaire three. SmartPlS software [46] used in the PLS analysis of this study requires minimum sample size equals to ten times the largest number of arrows pointing at a latent variable in the model, which is 70 observation, so the sample size of 192 end-uses is suitable for the PLS analysis of the research model. It should be noted that, not all end-users use all modules of the system or perform exactly the same tasks, so the aggregated experience represents the organizational level [2]

B. Measurement Instrument Development

This research adopts a survey questionnaire approach in order to test the proposed model. According to [47] employing survey questionnaires to measure and assess constructs and relationships, has been the preferred research methodology among IS scholars in 1990s and early 2000s. Likewise, survey questionnaires have been the preferred method for IS scholars studying user satisfaction [6] [48] [49] [50] Questionnaires provide an easy way to collect data from a large population. Furthermore, in most cases, their results hold a stronger external validity compared to other positivist methodologies such as experiments and field studies [43]. Construct measures were adopted where these existed in the literature to ensure the maximum content validity of the instrument.

1) Survey Questionnaire One

At time1, the decision of a new system has made, no modules of the new system were introduced, and the old information systems were in use. No one of end-users was aware of the introduction of a new information system and had not received communication concerning the change. In this phase, end-user overall satisfaction was measured as the extent to which end-users were satisfied with the information systems that they were using at time. The questionnaire consists of two sections, the first section was for collecting demographic information while the second section was for measuring the end-user overall satisfaction of the old information systems (SAT1) construct. SAT1 was measured with 4 items adapted from [42] by using Likert 5 points scale with 1=Strongly Disagree, 2=Disagree, 3= Neither agree nor disagree, 4 =Agree, 5= Strongly Agree. The reliability coefficients (Cronbach's alpha) of SAT1 was 0.7974 which exceed the recommended threshold value of 0.70 [51].

2) Survey QuestionnairesTwo and Three

At time 2, it was during-implementation after the key system components were implemented and in use while Time 3 was Post-implementation after the entire new information system was implemented and in operation for a month. When new modules were implemented, the parallel modules in the old system were completely displaced and taken offline. By Time 3, all modules and integration were complete and the old information system functions were completely displaced.

Eight constructs with 57 items were measured by survey questionnaire two or three instrument at time2 and time3 respectively.

The operationalisation of users' perceptions of change management effectiveness (CM) combines survey items from two existing management of change instruments. It is measured by the users' opinion of fairness, management effectiveness,

resources availability, communication, and training that have been exhibited by the Transit department management. Seven questions were adapted from [2] and two questions were adapted from [52]. Resistance to change (RST) was measured using four items from the instrument of [16]. Readiness for change (REA) was measured using 4 items adapted from [2], 4 items adapted from [53] and two items were adapted from [15]. Individual-related change self efficacy (SLF) was measured using 4 items from the instrument of [52]. In this study, End-user overall satisfaction was measured with 4 items adapted from [42].

The three quality aspects (i.e. information quality, system quality and service quality) were modeled as major constructs in the research model. They were chosen based on prior research, which suggests these three aspects of IS are important in user evaluations that lead to overall satisfaction [42] [50].

In this study, Information quality was measured with 7 items based on relevance, accuracy, Understandability, Format, Completeness, Credibility and Currency [42] [49] [54] [55] [56] [57] [58] [59]. System quality was measured with 7 items based on Ease of Use, Reliability, Availability, Response time, Flexibility, Integration [42] [57] [58] [59] [60] [61] and Security [62]. Service quality was measured based with 12 items based on Reliability, Responsiveness, Assurance, Empathy, Tangibles, Courtesy, Security, Privacy, Communication, Competence and Access [42] [48] [58] [60] [63] [64] [65].

Each dimension was measured with Likert 5 points scale responses regarding the user's frequency-based belief that their response is true. The Likert 5 point scale used was 1 = Strongly Disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly Agree.

IV. Data Analysis and Results

The research model depicted in Figure 1 was analyzed using a Partial Least Squares (PLS) path modeling technique. Specifically, the model was tested using linear PLS path modeling as implemented in the freely-available SmartPls software [46]. SmartPls simultaneously assesses the psychometric properties of the measurement model (e.g., the reliability and validity of the scales used to measure each latent variable construct), as well as the parameters of the structural model (e.g., the magnitudes and significance levels of the beta coefficients for each of the paths) between the latent variables [2]. Seventeen constructs with 118 indicators are used in the research model.

A. Measurement Model Validation

The factor loadings and cross loadings for the data indicate good convergent and discriminant validities with their latent respective, associated corresponding (and non-corresponding) latent constructs. All factor loadings are 0.70 or greater, indicating good indicator reliabilities. All cross-loadings are significantly lower in magnitude than the corresponding factor loading, Additionally, each item's factor loading on its respective construct is statistically significant ($p < 0.001$) which serve to affirm the convergent validity of these indicators as representing distinct latent constructs in the research model. Cronbachs Alpha, composite reliability scores (CR) and average variance extracted AVE, are reported in table II. All the reported composite reliability scores are above 0.86, which is greater than the suggested cutoff of 0.7 and indicate adequate construct convergent validity [66]. Moreover, all the reported average variance extracted values are above 0.6, which is higher than the suggested 0.5 value indicating adequate convergent validity for the latent variables.

Table III presents the results of testing the discriminant validity of the measurement scales. The bolded elements in the matrix diagonals, representing the square roots of the AVEs, in all cases are greater than the off-diagonal elements in their corresponding row and column, providing evidence of the discriminant validity of the scales [67].

TABLE II. Assessment of the Measurement Model

	Cronbachs Alpha	**Composite Reliability (CR)**	**AVE**
CM2	0.918564	0.932605	0.606339
CM3	0.939352	0.949007	0.674519
REA2	0.938720	0.947682	0.644450
REA3	0.950320	0.957287	0.691758
RES2	0.887666	0.922025	0.747254
RES3	0.872756	0.912826	0.723642
SLF2	0.865334	0.905681	0.706358
SLF3	0.836691	0.890742	0.670873
IQ2	0.930233	0.943422	0.704404
IQ3	0.921485	0.937015	0.680251
SQ2	0.927651	0.941494	0.696927
SQ3	0.934847	0.947068	0.718838
SRVQ2	0.942477	0.949922	0.612951
SRVQ3	0.956247	0.961432	0.675155
SAT1	0.800356	0.865275	0.617902
SAT2	0.809663	0.875539	0.638279
SAT3	0.899348	0.929816	0.768113

TABLE III. DISCRIMINANT VALIDITY (INTER-CORRELATIONS) OF LATENT VARIABLE CONSTRUCTS OF THE RESEARCH MODEL

	CM2	CM3	REA2	REA3	RES2	RES3	SLF2	SLF3	IQ2	IQ3	SQ2	SQ3	SRVQ2	SRVQ3	SAT1	SAT2	SAT3
CM2	**0.78**																
CM3	0.13	**0.82**															
REA2	0.54	0.12	**0.80**														
REA3	0.08	0.48	0.06	**0.83**													
RES2	-0.2	0.01	-0.20	-0.08	**0.86**												
RES3	0.15	-0.3	0.12	-0.22	0.05	**0.85**											
SLF2	0.10	0.09	0.20	0.03	-0.15	0.19	**0.84**										
SLF3	0.00	0.18	-0.00	0.14	0.02	-0.16	0.08	**0.82**									
IQ2	0.03	0.13	-0.15	0.13	-0.09	0.01	0.01	0.29	**0.84**								
IQ3	0.04	0.17	-0.05	-0.02	0.22	-0.17	0.14	0.15	0.08	**0.82**							
SQ2	0.12	0.05	-0.10	0.13	-0.28	0.01	-0.0	0.22	0.29	0.03	**0.83**						
SQ3	0.10	0.21	-0.05	0.12	0.09	-0.22	-0.04	0.05	0.06	0.22	0.15	**0.85**					
SRVQ2	0.16	0.02	0.10	0.04	-0.22	0.05	-0.11	-0.09	0.16	-0.0	0.25	0.14	**0.78**				
SRVQ3	0.08	0.16	-0.05	0.11	0.09	-0.28	-0.16	0.13	0.15	0.24	0.17	0.36	0.20	**0.82**			
SAT1	-0.3	-0.1	-0.05	-0.08	0.10	-0.05	0.09	0.13	0.13	-0.1	0.04	-0.1	-0.01	-0.08	**0.79**		
SAT2	0.55	0.11	0.48	0.14	-0.38	0.11	0.15	0.14	0.36	-0.1	0.45	-0.0	0.41	0.09	0.02	**0.80**	
SAT3	0.10	0.63	-0.01	0.43	0.10	-0.36	0.04	0.19	0.046	0.45	0.07	0.50	0.07	0.50	0.05	0.22	**0.88**

B. Structural Model

A bootstrapping procedure with 5000 resamples was used to generate t-statistics for the structural paths. The R^2 for the overall satisfaction of the new IS during implementation is 0.667 but after implementation is 0.706. The structural model, the path coefficients and the explained variances (R-square) are presented in Figure 2. The numbers in the middle of the arrows represent the contribution of each independent constructs to the dependent constructs. The numbers in the small boxes represent the percent of variation of the construct explained by the model. Table IV explains which hypotheses were supported. It can be observed that supported hypotheses at both time2 (during implementation) and time3 (post implementation) are H2, H4, H5, H6, H10, H11 and H12 while the unsupported hypothesis at both time2 and time3 are H7 and H8. Hypothesis H1, H3 and H9 are supported at one phase while it is unsupported at the other phase. Also, H13 was unsupported.

The value of R^2, in the case of standardized variables , may be decomposed in terms of the multiple regression coefficients "β_j" and correlations "cor (y, x_j)" between the dependent variable "y" and the explanatory ones "x_j" using (1) as stated in [68].

$$R^2 = \sum_j \beta_j \text{ cor } (y, x_j). \quad (1)$$

This decomposition allows understanding the contribution of each explanatory variable to the prediction of the dependent one and it makes sense only when the regression coefficients and the related correlations have the same sign [68]. Table V and table VI shows the contribution of Information quality, System quality and Service quality to the overall satisfaction of the new IS (SAT2 R^2) during implementation and (SAT3 R^2) post implementation based on (1), from which the most contributed part from the quality constructs during implementation is SQ2 (17.47 %) then IQ2 (15.36 %) and at the end SRVQ2 (12.19 %). Also the three quality constructs together contributes by 45.02 % of SAT2 R^2 which has equivalent value of 0.3002 from 0.6667 (SAT2 R^2). The rest 54.98 % of SAT2 R^2 which has equivalent value of 0.3665 from 0.6667 is due to the contribution of other constructs to SAT2 R^2 while at post implementation phase, the most contributed part from the quality constructs is SRVQ3 (18.60 %) then IQ3 (17.39 %) and at the end SQ3 (16.08 %). Also the three quality constructs together contributes by 52.07 % of SAT3 R^2 which has equivalent value of 0.3679 from 0.7065 (SAT3 R^2). The rest 47.93 % of SAT3 R^2 has equivalent value of 0.3386 from 0.7065 is due to the contribution of other constructs to SAT3 R^2

V. DISCUSSION

This research hypothesized that lower satisfaction with the old information systems would result in a more favorable perception of change management to the new integrated information system. However, the empirical results show that the satisfaction with old systems has a significant impact on the perception of how well the change to the new system has been managed during the implementation phase but insignificant impact at post implementation phase.

The user perception of change management effectiveness exerts positive effect on readiness for change, as well as on the overall satisfaction both during and after an implementation. When users believe that management has been fair, supported the change, communicated well, and provided good training for the new system, they are more prepared for and satisfied with the implementation. Readiness for change positively affects overall satisfaction during and after the implementation. How well management of change has been conducted through the change process is relevant in post implementation phase because the strategies in change management are still contributing to the ease of use of the new system, etc. If dissonance had existed from unrealized expectations, then high satisfaction in an earlier period and low satisfaction in a later

TABLE IV. RESEARCH HYPOTHESES TESTING OF THE MODEL

Hypotheses		Decision
H1a	(-) **SAT1 -----> CM2**	Supported***
H1b	(-) **SAT1 -----> CM3**	**Not Supported**
H2a	(+) **CM2 -----> REA2**	Supported***
H2b	(+) **CM3 -----> REA3**	Supported***
H3a	(+) **CM2 -----> SLF2**	**Not supported**
H3b	(+) **CM3 -----> SLF3**	Supported**
H4a	(-) **CM2 -----> RES2**	Supported*
H4b	(-) **CM3 -----> RES3**	Supported***
H5a	(+) **CM2 -----> SAT2**	Supported***
H5b	(+) **CM3 -----> SAT3**	Supported***
H6a	(+) **REA2 -----> SAT2**	Supported***
H6b	(+) **REA3 ------> SAT3**	Supported***
H7a	(+) **SLF2 -----> SAT2**	**Not supported**
H7b	(+) **SLF3 -----> SAT3**	**Not supported**
H8a	(-) **SLF2 -----> RES2**	**Not supported**
H8b	(-) **SLF3 -----> RES3**	**Not supported**
H9a	(-) **RES2 -----> SAT2**	Supported*
H9b	(-) **RES3 -----> SAT3**	**Not Supported**
H10a	(+) **IQ2 -----> SAT2**	Supported***
H10b	(+) **IQ3 -----> SAT3**	Supported***
H11a	(+) **SQ2 -----> SAT2**	Supported***
H11b	(+) **SQ3 -----> SAT3**	Supported***
H12a	(+) **SRVQ2 -----> SAT2**	Supported***
H12b	(+) **SRVQ3 -----> SAT3**	Supported***
H13	(+) **SAT2 -----> CM3**	**Not Supported**

period would have occurred. This study did not see such occurrences**.**

Resistance is negatively affect overall satisfaction during implementation but not in post implementation. It has been seen that, the significant negative effect of end user perception of change management effectiveness is much larger in post implementation than during implementation which in turns

TABLE V. CONTRIBUTION OF QUALITY CONSTRUCTS TO OVERALL SATISFACTION OF THE NEW IS DURING IMPLEMENTATION

	IQ2	**SQ2**	**SRVQ2**
R^2 part contributed by the construct to SAT2 R^2	0.102387	0.1165056	0.081255
Contribution to SAT2 R^2 %	15.36 % of SAT2 R^2	17.47 % of SAT2 R^2	12.19 % of SAT2 R^2
Cumulative contribution to SAT2 R^2 %	15.36 % of SAT2 R^2	32.83 % of SAT2 R^2	45.02 % of SAT2 R^2

TABLE VI. CONTRIBUTION OF QUALITY CONSTRUCTS TO OVERALL SATISFACTION OF THE NEW IS POST IMPLEMENTATION

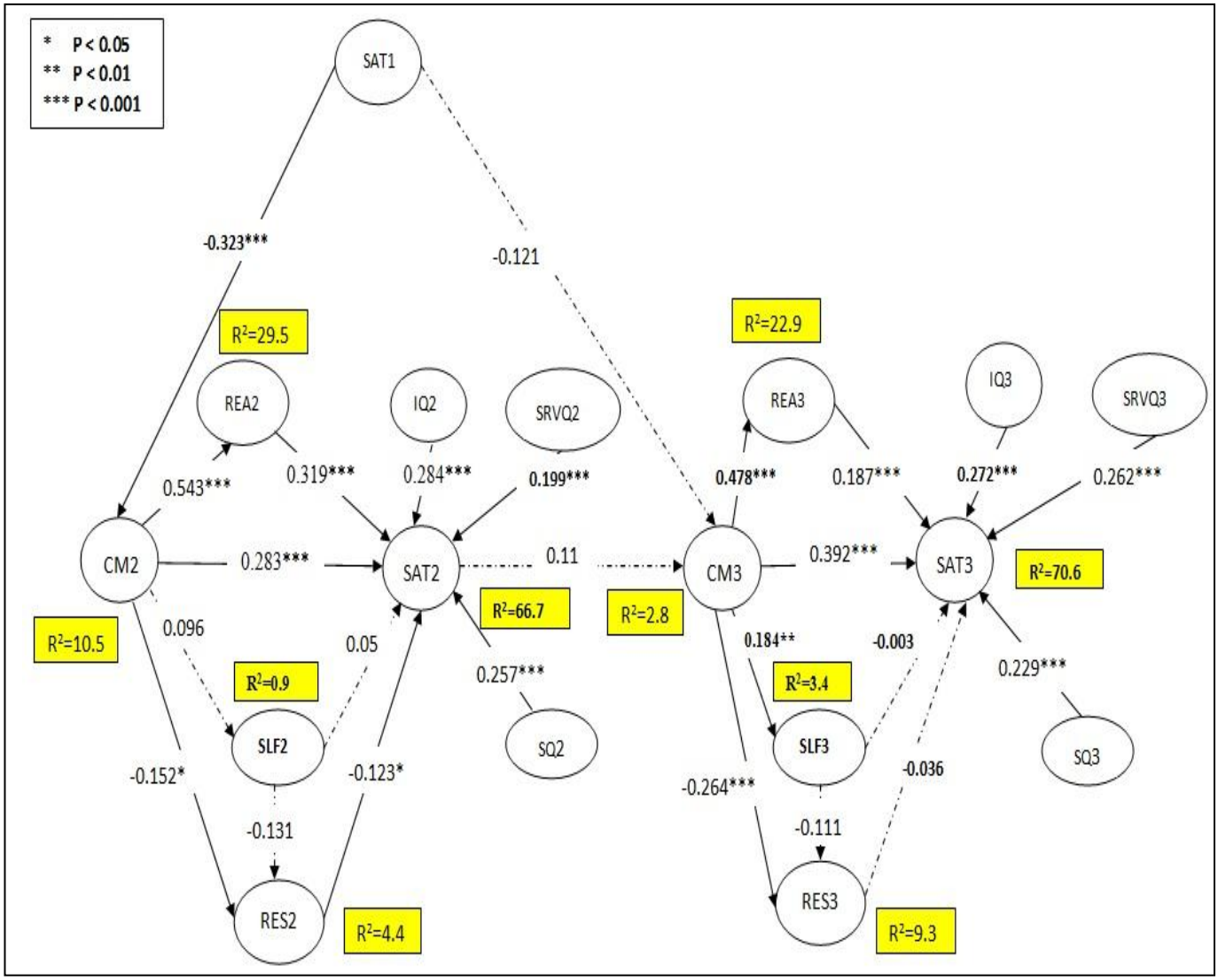
	IQ3	**SQ3**	**SRVQ3**
R^2 part contributed by the construct to SAT3 R^2	0.1228837	0.113582	0.131426
Contribution to SAT3 R^2 %	17.39 % of SAT3 R^2	16.08 % of SAT3 R^2	18.60 % of SAT3 R^2
Cumulative contribution to SAT3 R^2 %	17.39 % of SAT3 R^2	33.47 % of SAT3 R^2	52.07 % of SAT3 R^2

eliminates resistance to change effect on end-user overall satisfaction after implementation.

Individual-related change self efficacy has insignificant effect on Resistance to change and end-user overall satisfaction during and post implementation while the perception of change management effectiveness has significant effect on change self efficacy post implementation only.

Information quality is positively affect overall satisfaction during and after the implementation but its impact is relatively larger post implementation.

System quality is positively affect overall satisfaction during and after the implementation but its impact is relatively larger during implementation and it is the most quality factor that contributes to the overall satisfaction of the new information system during implementation.



Service quality is positively affect overall satisfaction during and post implementation but its impact is larger after implementation and it is the most quality factor that contributes to the overall satisfaction of the new information system post implementation.

The three IS quality dimensions contribute by about 45 % of overall satisfaction of the new information system during implementation and contributes by about 52 % of overall satisfaction of the new information system post implementation which clarify the important roles that IS quality dimensions play during and post implementation in enhancing end-user overall satisfaction of the new information system.

VI. Limitations and Future Research

The study may be limited by results of self-reports, which may be unduly biased by a single cross-sectional test method. This limitation is balanced by multiple samples performed at three points in time. The data were collected in the manner developed and detailed due to eminent system implementation.

Although this study was conducted in Suez Canal transit department, it can be applied to any other information system implementation. The new information system in this study is mandatory and caution should be exercised when generalizing results to users of voluntary systems. A further research should be conducted to evaluate the interactions or the relative importance of change management factors to the downstream constructs.

This research directly measures overall satisfaction at three points of time: pre, during and after an implementation. It did not measure the dissonance between what users may have expected and what they experienced. A user may have higher than usual expectations of the new system, and hence, low satisfaction, although the system is implemented and in operation as designed and delivers the promised benefits. Further research can be conducted to study dissonance of users.

VII. CONCLUSION

The objective of this study is to understand the impact of change management perceived effectiveness on resistance to change, readiness for change, change self efficacy and end-user overall satisfaction in new IS implementation in conjunction with the impacts of the IS quality dimensions which include information quality, system quality and information quality on the end-user overall satisfaction of the new information system. The results indicate that, the end-user overall satisfaction as a surrogate for IS success is strongly influenced by change management and IS quality dimensions. The study draws attention to the role change management has in building user readiness and reduce change resistance to increase end-user overall satisfaction of the new information system. Readiness for change has a significant positive effect on overall satisfaction during and after an implementation; however, resistance to change has a significant effect on end-user overall satisfaction during implementation but not after an implementation. Also, IS quality dimensions play important roles in enhancing end-user overall satisfaction of the new IS during and after the implementation. Organizations should pay more attention to system quality during IS implementation but for post implementation, it should give the most attention to the service quality. This study contributes to the IS literature by providing a new perspective that complements the extant IS adoption as well as change management and IS quality research. Change management strategies that raise users' opinion of fairness, management support, resources availability, communication, and training will increase end-user acceptance of new IS in conjunction with IS quality dimensions.

Problems with end-user acceptance of new information systems can be overcome by establishing mechanisms for end-user feedback [2] [69]. Change is an adaptive process. The survey instrument can be used to gather inputs for management to identify issues faced during a change process and after the change to adapt both of change management strategies and IS quality dimensions to ultimately enhance end-user overall satisfaction.

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