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The Effect of Corporate Cultural Factors on the Data Warehousing Success: An Empirical Investigation

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ABSTRACT

This study is aimed at identifying the impact of corporate cultural factors on successful development of data warehousing in the United Arab Emirates. The theoretical framework of the study is formulated based on analysis of related literature coupled with the information gained from interviewing data warehousing experts. Five hundred and eighty data warehouse users in 34 companies were surveyed to obtain their perceptions of the extent that each of 132 items had actually contributed to their firms' DW success at different phases of development. Rigorous multivariate statistical analysis procedure has been followed to design and construct an overall model of DW success. The model has proven that all its independent variables have significant influence on the DW overall success and that corporate cultural factors have dominant impact on this success throughout the different phases of DW development.

INTRODUCTION

The last two decades have witnessed cautious spreading of data warehouses (DW) across different industries in the Western world. Although data warehousing providers have repeatedly reported many success stories of the use of data warehousing, a number of failure cases have been published, too. In essence, the economic result of using data warehousing on business performance has been mixed. There is a need for a study to investigate data warehousing success.

Although many related studies to data warehousing have been published, they have been concerned with technical issues. They have provided a comprehensive understanding of the technical factors affecting data warehousing success, they did not however account for many other important dimensions. Business/culture/implication related issues are of interest and fall among these left for future studies. Very few academic studies have endeavored to explore the factors that may affect data warehousing implementation, e.g., [70]. However, one may argue against their generalizability to the data warehousing problems in non-Western countries.

Many empirical studies have examined the different effects of individual organizational factors on the successful implementation of different IT tools ([75] [35] [38] [1] [106] [78] [125]; to name a few). Many ideas and theories have been accumulated and several models of implementation have been proposed for information systems ([71] [79]; and [108]). However, a comprehensive research model, according to Cooper and Zmud [15], should provide a basis for answering research questions which build upon prior research and which have a good probability of significantly enhancing an understanding of the implementation process.

The studies conducted by Kimberly & Evanisko [61] and Cooper & Zmud [15] are two major endeavors to construct empirical integrative models to deal with success of information technology implementation. They proposed a model in which IT adoption is a function of task compatibility and technology characteristics. Yet, cultural factors were left behind. Overall, there is a scarcity of

empirical studies that examine the data warehousing success in general and the effect of cultural factors on this success within an integrative model.

The current exploratory study intends to focus on the effect of the cultural factors on the data warehousing success. It aims at providing empirical evidence that identifies the cultural factors that influence successful adoption & diffusion of data warehousing, thereby extending the body of knowledge concerning management support systems implementation in general and data warehouses in specific.

THE THEORETICAL FRAMEWORK

Though there is evidence that sequential stage models of technology diffusion may not depict actual implementation processes [32] [124], recent work suggests that such models may be more appropriate for technologies which are borrowed or adapted rather than custom made [84].

Cooper and Zmud [15] proposed a model that described the adoption and diffusion of IT innovation in terms of six stages: initiation, adoption, adaptation, acceptance, routinization, and infusion.

The current study uses a similar model to describe the DW completion process. The process consists of four phases: initiation & adoption, adaptation, acceptance & routinization, infusion. This approach usefully emphasizes the continual tension between efficiency and effectiveness in the use of IT. At one time it is necessary to relax and let the organization search for effectiveness; at another it is necessary to focus on efficiency in order to control costs [11, Chapter 7].

A Model of The Data Warehouse Success

Reviewed related literature and semi-structured interviews of data warehousing experts have suggested four groups of explanatory variables: support characteristics, external environment characteristics, implementation characteristics, and organization characteristics. However, the current study expects a sound impact of corporate culture as a major organization dimension. It also introduces the system appropriation-related effects to the model. Two factors that contribute to system appropriation: shared understanding & meanings of the DW project, and clarity of routines & processes.

Figure 1 presents the model of DW success examined in this study. The model is comprised of seven sets of variables: (1) success of the DW, (2) support characteristics, (3) characteristics of DW implementation, (4) external environment characteristics, (5) corporate culture & organizational climate characteristics, (6) meanings & understanding of what the DW project is about, and (7) clarity of routines & processes of capturing, processing and reporting data from the DW.

Although effort is exerted to identify all factors that may influence Data warehousing success, this study is meant to concentrate on analyzing the impact of corporate culture & organizational climate on that success. Constructing an integrative model of DW success enables the researcher to account for the effects of non-corporate culture & organizational factors when estimating the model.

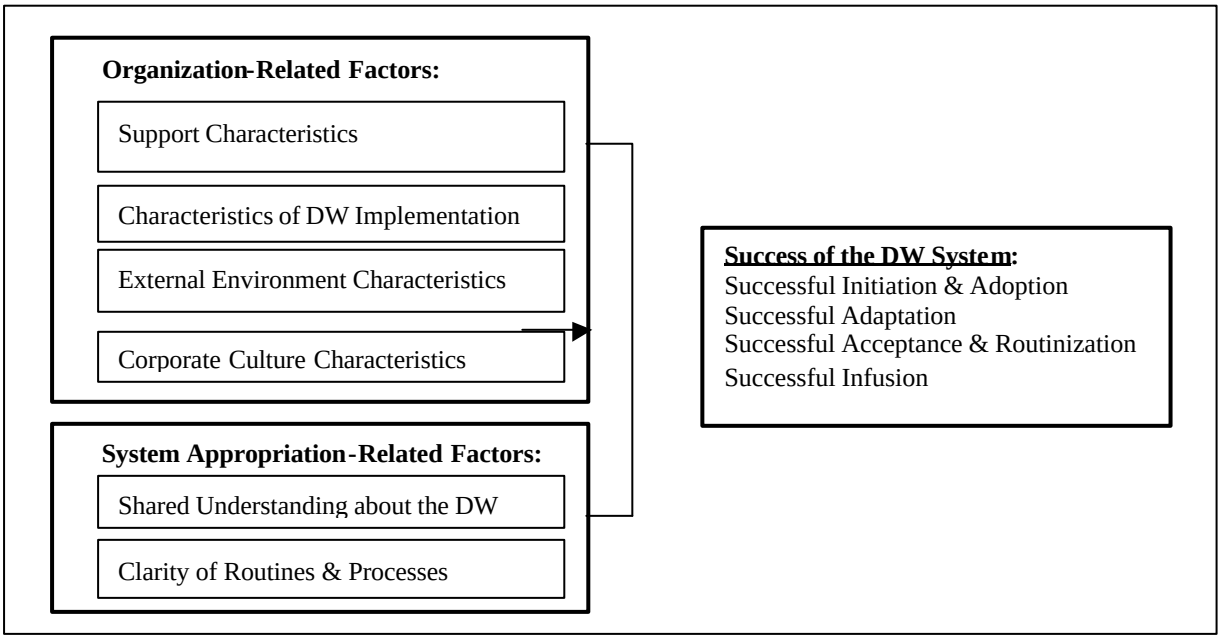

Figure 1
Integrated Model of the Factors that Influence DW Success

First. Success of the Data Warehousing System

Initially, Sanders and Courtney [102] posit that successful adoption of a DSS contributes positively to its successful management after adoption. Data warehouses are used in conjunction with decision support systems at large. Therefore, successful adoption of a data warehouse is expected to contribute positively to the data warehouse successful management.

Success of a data warehouse project, as a DSS related project, is defined in terms of its ability to encompass the real information needs of the business. Generally speaking, the most difficult data warehousing problems do not have to do with technology. Rather, they have to do with delivering value to users, maintaining the data warehouse and shifting from a transaction processing to a decision-support mindset [41].

Prior research viewed management support systems' success from a variety of perspectives and used varying definitions and measures of success, including: (1) overall user satisfaction and decision-making satisfaction (e.g., [102]), (2) levels of system usage (e.g., [82]), (3) perceived benefits of the information system (e.g., [80]), (4) improved decision quality and performance (e.g., [106]), and (5) business profitability (e.g., [77]).

Primary interviews of DW experts revealed that data warehousing success indicators should differ from one DW development phase to another. Therefore, it seems crucial to select different sets of DW success variables, such that each set of variables relates to a specific stage of successful completion. The concern here is with dynamic implementation of the DW.

Second. Support Characteristics:

Data warehousing projects are described in the literature as expensive, time-consuming undertakings [49] [101] [119]; therefore, having adequate resources should be critical to their success [8].

Adequate resources are defined in terms of data, skills, money, and IT related infrastructure facilities to support the data warehouse.

Past studies have found that the quality of an organization's data can have a profound effect on systems initiatives and that companies that improve data management realize significant benefits [30] [37].

Poe [87] predicates that quality of the source data (degree of detail, cost, age, how data is integrated and transformed, and integrity) is an important ingredient to the success of a data warehouse system. Besides, Davydrov [23] states that it is essential to guarantee that needed skills are in place to support the adoption of a data warehouse.

The people who participate in systems implementations should be as important to implementation success as the way the project is managed and approached 116] [117]. The learning curve in data warehousing is very steep, and the project suffers if the skills of project members are inadequate to complete the project tasks [8] [97]. Research has addressed many facets of teams, including the impact of the quality of teams on implementation and the effects of team member characteristics [14] [122].

The functional dependency of a DW on other operational databases in the firm, according to Lazos [65] is fundamental. Front-end analysis and decision support tools allow users to process the data, both in the data warehouse directly and in local extracted copies. Moreover, it has been argued that a marriage of Internet and DW technologies is natural [90].

Data warehousing implementations are large, complex undertakings, and funds should be available when needed; otherwise, tasks cannot be completed, deadlines are missed, and requirements cannot be met [95] [70]. In fact, research has shown that as the time and funds increase, the likelihood of system success increases [109].

Third. External Environment Characteristics

The environment surrounding the DW is defined as the external environmental factors that influence its use of information. The existence of powerful forces affecting the enterprise such as turbulence in the economic, competitive or regulatory environments is a good example of such factors.

The importance of organization's environmental context for innovation has been acknowledged conceptually, but rarely examined empirically. One of the pioneering studies that have explored the effect of this variable was Kimberly and Evansiko [61]. Intensive competition has become the norm in nowadays business environment. Kimberly and Evansiko [61] hypothesized that competition in an organization's domain is related to adoption behavior.

Uncertainty about the environment is a fundamental problem with which executives must cope [110]. One of the primary means for doing so is collecting more information [36]. The higher perceived environmental uncertainty, the greater the felt need for information [38]. In fact, information is often defined in terms of its ability to reduce uncertainty [17].

Environmental turbulence has been discussed most frequently as consisting of two dimensions: complexity – the number of factors that must be addressed – and volatility – the rate of change of those factors [31] [110] [28] [48]. Both dimensions are likely to affect the design requirements relating to scope (complexity) and timeliness (volatility) of data warehousing systems through the 'strategic choice' of the executives in an organization [12].

Economic stability and complexity are cited as major influences on innovation behavior and technological innovation success [123] [88].

There is some convergence around the notion that more complex environments encourage adoption of innovation as an organizational strategy for coping with the uncertainty that accompanies unpredictability [4].

Fourth. Implementation

System implementation is defined, according to Cash et al. [11, p. 50], as the phase that involves extensive user-IT coordination as the transition is made from the predominately technical, IT-driven tasks of the construction step to its completed installation and operation in the user environment.

The implementation consideration has been shown as a key element in successful development of information systems [118: pp. 1-46] [113, Chapter 13]. Careful system implementation is defined as "the degree to which user training, data integration, benefits/costs relationship, selecting a pilot application, quick and frequent building of prototypes, incremental implementation, proactive and publicized reporting, and end-user involvement affect the data warehouse success" [25].

Gray [40]; Keenan [59]; Darling [19]; Griffin [42], to name a few, have postulated that managerial difficulties are important factors in successful management of the data warehouse.

Planning the DW project is very important, too. Data warehousing initiatives are large and complex undertakings, and planning for them should be carefully addressed [26] [101]. Project planning has been identified quite often as an important factor of information systems implementation success [2] [50].

King [62] stresses the importance of MIS planning. The process of MIS planning includes: defining the mission and the objectives of information systems, and mapping them to those of the enterprise on the decision, to adopt such systems. It is one of transforming the organizational strategic purpose and direction into an appropriate, relevant, and consistent MIS objectives, constraints, and design strategies.

Fifth. Corporate Culture

Data warehousing raises a number of cultural issues such as the problems that arise when people are not used to sharing their data. IT staff can also be a problem. They need to be able to produce demonstration systems quickly and to think themselves into the shoes of line management without detailed requirement specifications [7, p. 72].

At the core of the data warehousing issue are two tightly intertwined questions: Who should own the data warehouse? And what is IS's role in data ware housing? Some would see that as long as data in the warehouse is used for business decision-making, therefore, the responsibility and ownership lie primarily with the business areas that generate the data and feed the warehouse. Advocates of Data Marts' viewpoint stresses that this ownership lie typically with the functional area person responsible for the particular issue. Others assert that successful exploitation of a data warehouse necessitates organizational changes, which means move away from the functional ownership concept and move towards a shared way of using information and resources. Still a third group believes that as long as this central core of information - the data warehouse - is critical to the success of management in the firm, somebody has to own it. Clearly, the CIO is the someone who is going to have to own it.

As for the IS service role, it is focused on creating, maintaining, and administering the warehouse, not "owning it". An open flexible IS department is often a critical aspect in the success of a warehousing project [96].

Researchers have recognized the crucial impact of top, executive, and operating management support on successful implementation of MSS in general. Large, complex systems projects (e. g., data warehousing) induce change within the organization and likely cause resistance through redistribution of organizational power or from the resulting uncertainty among employees [33] [57]. Management support can help overcome such resistance

Finally, a data warehouse is not an operational system that people have to use to do their jobs. It has value, however, only if used. Inmon [55] argues that in systems based on operational data, the classic systems-development-life- cycle applies, with the first step being requirements gathering. In the data warehouse world, the life cycle is reversed. A simple data warehouse is built and then over time, as people understand what the data can and cannot do for them and the warehouse evolves, the requirements become understood. In other words, the life cycle of the data warehouse is data-driven rather than requirements-driven.

Sixth. Shared Understanding & Meanings of the DW Project:

This variable deals with learning and shared understanding of what the DW project is about, what it means for them, for the organization, for the different stakeholders [113]. It is important to know if there are very different understandings and interpretations among users, management, and IT group of what the information the DW system provides is used for.

The Northwestern University studies of the fate of management information systems and operations research provide some clues. Published results of this research [83]

[91] [92] [93] indicate that several factors are associated with successful implementation.

Operational and tactical information systems, such as Transactions Processing Systems, Information Reporting Systems, and Decision Support Systems, are different from strategic information systems, such as Executive Information Systems and Data Warehousing Systems. Making decisions, looking for trends, planning, taking action, finding problems, historical reference, budgeting, controlling and guiding activities, reporting to superiors, aiding in increasing productivity, cutting costs are the primary concerns of operational and tactical information systems [34] [72]. Strategic information systems, on the other hand, aim at improve competitiveness by changing the nature or conduct of business [118].

Seventh. Clarity of Routines and Processes:

This variable is defined as how clear are the procedures and organizational process that relate to the DW, for organizing new data entry, for extracting reports, or if there are ambiguities in the way data is captured, processed and reported [125] [3].

Zmud [125] postulated that this variable is concerned with how clear are the procedures and organizational process that relate to the DW, for organizing new data entry, for extracting reports, or if there are ambiguities in the way data is captured, processed and reported.

Hypothesized Effect of Corporate Culture Factors on the DW Success

Based on the above-mentioned integrative model of data warehousing success and focusing on the expected effects of the culture-related factors, the following functional relationships are hypothesized.

First. Hypothesized Effect of User Partnership

Established partnership and co-operation among users, management, and IT group in adopting and managing the system is vital for its continuity and success [108]. User partnership constitutes a social influence that impacts user behavior toward the system [6]. It is considered an effective approach to overcome resistance to change.

The people who participate in systems implementations should be as important to implementation success as the way the project is managed and approached [116] [94] [117]. In the innovation literature, positive associations have been proposed or found with adoption [4] [46] and with acceptance [22]. OR/MS/MIS research has found positive associations with adaptation and routinization [39] [83] [125]. However, inconsistent results have been observed between user partnership and usage [125].
Thus, one can expect:

H0(1a): The higher the user partnership in adopting and managing the system, the more successful the new system adoption.
H0(1b): The higher the user partnership in adopting and managing the system, the more successful the new system adaptation.
H0(1c): The higher the user partnership in adopting and managing the system, the more successful the new system routinization.
H0(1d): The higher the user partnership in adopting and managing the system, the more successful the new system infusion.

Second. Hypothesized Effect of Management Commitment

Several researchers have emphasized the importance of top management support as a determinant of system success [34] [67] [68] [72] [102] [44]. In the innovation literature, positive associations have been proposed or found with adoption [4]. In the MIS literature, Lucas [72] found support to be positively associated with system success, while Lee [67] reported that lack of support was a critical barrier to more effective system utilization. OR/MS/MIS research has found positive association with adaptation and usage [91] and with satisfaction [125].

Therefore, one would expect:
H0(2a): The stronger the management commitment to the new system, the more successful the new system adoption.
H0(2b): The stronger the management commitment to the new system, the more successful the new system adaptation
H0(2c): The stronger the management commitment to the new system, the more successful the new system routinization.
H0(2d): The stronger the management commitment to the new system, the more successful the new system infusion.

Third. Hypothesized Effect of User responsibility for system

This aspect is related to user participation and involvement. It contributes to corporate culture and organizational climate through motivating users to accept the system, commit to it, and use it [81]. Generally, positive associations have been proposed or found with satisfaction [45] [114] and performance [43]. It is believed that the greater the user responsibility for system, the less likely the user's resistance to change, and the more likely the system would be a success at different phases of development.

As a result, one would expect:
H0(3a): The stronger the user feel responsible for the new system, the more successful the new system adoption.
H0(3b): The stronger the user feel responsible for the new system, the more successful the new system adaptation.
H0(3c): The stronger the user feel responsible for the new system, the more successful the new system routinization.
H0(3d): The stronger the user feel responsible for the new system, the more successful the new system infusion.

RESEARCH METHOD

Sampling Procedure

A random sample of data warehouse users is selected from each firm in the study population of firms that satisfied the research criterion. The sampling design is nearly proportionate stratified random sampling.

All medium-to-large firms that are known to be undergoing or having completed a data-warehousing project are included in the study pool from which the sample is drawn. First, the number of companies included in the study sample from each of the UAE industries varied as a function of how important the respective industry was to the national economy. Second, the number of questionnaires to be filled out by each of the selected companies is determined (10, 20, or 30 depending on the company size approximated by its sales). Third, a random sample of individuals (30% senior management, 40% functional management end-users, and 30% IS personnel) within each of the chosen companies is selected.

Measurement of Variables

A data warehouse is defined in the current study as "a subject-oriented, integrated, time-variant, nonvolatile collection of data that is used in the support of management's decision-making process" [54, p. 1]. The following is how each of the study variables was measured in this study.

Success of The Data Warehouse. Four variables are used to measure success of the data warehouse systems through its different phases of development: success at the initiation & adoption phase, success at the adaptation phase, success at the acceptance & routinization phase, and success at the infusion phase. Here is a list of detailed items that are used to operationalize each of the DW success variables.

1. Data warehouse success at the initiation & adoption phase: match of DW with organization [15], timely DW decision to invest to exploit the new opportunity and make use of new technology, DW used in organization's work [15], DW answers new decision questions [70], and DW is in long term business plan,
2. Data warehouse success at the adaptation phase: DW is ready to use [15], DW is responsive [56], and can identify different and sophisticated uses [100],
3. Data warehouse success at the acceptance & routinization phase: how successful is the project team in resolving initiation issues [112], expandable DW use [97], scaleable DW [3], DW planned workability [3], DW use encouraged [15], people induced to commit to DW use [15], how successful is the steering committee in resolving integration issues [37], work practices are flexible modified [49], DW viewed as asset [102], and DW changing executives' work [80],
4. Data warehouse success at the infusion phase: the organizational systems adjusted for DW [15], and DW used to full potential [15].

Support Characteristics. Three variables are employed to measure the support characteristics: data management, IT suitability, and system reliability & support team responsiveness. The following is a list of detailed items that are widely selected by related literature to represent each of these three support characteristics:

1. Data management: Availability of data management tools to manipulate the data as necessary, availability of metadata to provide a detailed attribute map of all DW data [3],
2. IT suitability: Suitability of the DW platform, sophistication of IT networking in place, tuning each data mart for the particular function it provides for each business area [54] ,
3. System reliability & support team responsiveness: High level of compatibility among hardware, network, and software, tuning each data mart for the particular function it provides for each business area [54].

External Environment. A single variable is utilized to measure the external environment: industry environmental pressures . Detailed items that are employed to operationalize this variable are given in the following.

1. Industry environmental pressures: Volitality of the firm economic environment, volitality of the firm competitive environment, complexity of the firm competitive environment, volitality of the firm regulatory environment [29] [48].

Characteristics of the Data Warehousing Implementation. Two variables are frequently cited in related empirical studies to measure the characteristics of data warehousing implementation: end-user involvement & expectations, and use of prototyping. The detailed items that are employed to operationalize these two variables are given in the following.

1. End-user involvement & expectations: Importance of user expectations about the DW potential capabilities to the DW implementation, importance of the system user sponsorship to the DW implementation, importance of end-user involvement to the DW implementation [5],
2. Use of prototyping: Importance of quick and frequent building of prototypes to the DW implementation, importance of prototyping tools to the DW implementation [54] [25].

Corporate Culture & Organizational Climate. Three variables are chosen to measure the characteristics of corporate culture & organizational climate: user parntnership, management commitment, and user responsibility for the system. The detailed items that are utilized in operationalizing these three variables are given in the following.

1. User partnership: The DW users, management, and IT group are partners in adopting the DW, the DW users,

management, and IT group are co-operating in managing the DW [108] [6],
2. Management commitment: A top manager who is a visionary or a leader supports the DW system, a top manager who believes that DW creates business opportunities supports the DW system, top management is strongly in favor of the concept of DW, a committed and informed executive sponsor supports the DW system, a committed and informed operating sponsor supports the DW system, top management support to increase IT infrastructure capabilities [44],
3. User responsibility for system: Responsibility for the system lies with the business area that generates the data, responsibility for the system lies with the functional area, responsibility for the system is shared among all users [81].

Shared Understanding & Meanings of the DW Project. A single variable is utilized to measure the shared understanding & meanings of the DW project: DW is aimed at executive use. The detailed items that are used to operationalize this variable are given in the following.
1. DW is aimed at executive use: The DW aims at improving the way managers conduct business, the DW aims at allowing managers to share information with customers and vendors, the DW aims at integrating information for effective use by executives [118].

Clarity of Routines & Processes. A single variable is used to measure the clarity of routines & processes: clarity of procedures. The detailed items that are utilized to operationalize this variable are given in the following.
1. Clarity of procedures: Clarity about the organizational procedures of capturing data, clarity about the organizational procedures of processing data [52].

Analytical procedure

A detailed questionnaire is developed, reviewed, pilot tested, and revised. Reliability and confirmatory factor analyses are employed to check reliability and validity aspects of the dependent and independent side variables.

Multivariate variance analysis and multivariate regression analysis are utilized to examine the relationships between the dependent and independent variables in the study model and test the study hypotheses.

DATA ANALYSIS

Sample Characteristics. The sample contained almost equal percentages of governmental and public companies, on one hand, and private companies, on the other. All these companies were medium to large size and with annual sales between 200 and 800 million Dirhams.

The study sample nicely represents all possible levels of DW technology adoption among these firms. A reasonable degree of adoption levels, i.e. moderate variation, would be favorable for any further statistical investigation.

Respondent Experience. Two criteria were used to insure reasonable respondent knowledge of the system: (1) The respondent must have had a minimum of six months' experience in using IT tools, and (2) The respondent must have had at least two years total experience as a top manager/executive, functional manage/staff, or IS personnel to qualify as a member of his or her respective constituency group.

As expected, the individuals surveyed had a high degree of experience with respect to using IT tools. Their IT experience ranged from six months to twelve years, with a mean of 2.25 years and a standard deviation of 0.56 years.

Reliability of Dependent and Independent Variables

Cronbach's Alpha is perhaps the most recommended method of measuring reliability, and the recommended measure of internal consistency for each of the dimensions determined from the factor analysis [105] [66] [104] [47].

Reliability of Independent Variables:

Reliability analysis is performed on all the eleven independent variables. Only system reliability & support team responsiveness had lower Cronbach's Alpha than the predetermined cut off point of 0.70. It had an Alpha of 0.67, which is slightly below the acceptable 0.70 threshold, but still can be tolerated if the constructs make sense [89]. All the other variables passed this internal consistency test. Thus, there will be 11 valid independent variables to use in all further analysis.

Reliability of the Dependent Variables:

Cronbach's Alpha for each of the study dependent variables is computed. All of the selected variables pass the 0.7 threshold requirement. Thus, all dependent variables are considered reliable to use in further analysis.

Validity of Dependent and Independent Variables

Validity is the degree to which an instrument measures the construct under investigation [74, pp. 208-211 and 233-236]. It can be established by submitting the data for factor analysis [104] [13]. The results of factor analysis can confirm whether or not the theorized dimensions emerge.

A confirmatory factor analysis is employed to show that the variables have discriminant validity. This discriminant validity is confirmed if the pattern of items loading onto extracted factors should produce the items in the variables –

and this happens if the loading of each item is high on the designated factor and low on other factors.

Validity of Independent Constructs:

All the items of all the variables are entered into factor analysis where the number of factors extracted is equal to the number of variables. Ideally, items in one variable load strongly only onto one factor. If an item or a variable produce bad results then one should remove the offending item (so long as the remaining variable is reliable) or remove the variable entirely and seek a solution with fewer factors.

Investigating the offending data items in the initial confirmatory factor analysis based on the Maximum Likelihood method of extraction (ML) with oblimin rotation according to the above criteria, eleven factors resulted. The eleven extracted components/factors are associated with eleven constructs that were identified previously, but with slight changes by removing certain items from these constructs. The KMO statistic was .804. The eleven extracted factors explained 84.6% of the total variation in the data items. Therefore, there were eleven independent variables to use in analysis.

Validity of Dependent Constructs:

As is done with the independent variables, confirmatory factor analysis is performed to show that these outcome variables have discriminant validity, too.

Analysis shows that the variables are satisfactory since they correspond to the four extracted factors (KMO is .848) and the off-factor weightings are all below 0.4 . Therefore, there were four success variables to use in analysis.

The Model Design

The classical procedure of developing a multivariate analysis model of variance analysis was followed. First the main effects were determined, then the interaction effects, followed by the within terms, and finally the covariantes effect.

The model employed is designed with two sides: dependent and independent. The dependent side included four dependent variables (success of the DW at the different DW adoption & diffusion phases). However, the independent side included two main effect factors (4 levels of DW adoption/diffusion phase, and 7 levels of jobs). It also included the interaction effect between DW development and job positions (to account for the perceptions of users who are responsible for different jobs and use DW systems at different phases of development) and eleven covariates. In order for MANOVA to reflect the way that the data was collected and because of the fact that respondents were grouped within firms, analysis was constructed so that to distinguish between effects related to DW adoption & diffusion phases and job positions, on one hand, and firms within phases, on the other. Finally, eleven covariate terms representing the reliable and valid independent variables widely used in related literature are included. The design reads as follows:

DW Success at initiation & adoption
DW Success at adaptation
DW Success at acceptance & routinization = Intercept + PHASE + JOB + PHASE*JOB
DW Success at infusion + FIRM(PHASE)
+ X5DATA + X5GOODIT + X5SUPPRT + X7ENVIRO
+ X8PRTCP + X9USEREX + X9PROTYP + X10COMIT
+ X13RESPN + X16EXECS + X17PROCS

Where,

PHASE denotes DW phase of development,
JOB denotes respondent job,
PHASE*JOB denotes the interaction effect of DW phase of development and respondent job
FIRM(PHASE) denotes the firm effect within the different DW phases of development
X5DATA denotes data management
X5GOODIT denotes IT suitability
X5SUPPRT denotes system reliability & support team responsiveness
X7ENVIRO denotes industry environmental pressures
X8PRTCP denotes user partnership
X9USEREX denotes end-user involvement & expectations
X9PROTYP denotes use of prototyping
X10COMIT denotes management commitment
X13RESPN denotes user responsibility for the system
X16EXECS denotes DW is ained at executive use
X17PROCS denotes clarity of procedures

All dependent and independent variables in the model were computed on the basis of the simple unweighted average of the items included of the reliable and valid variables per the analysis given in the previous section.

Estimating the Model

Multivariate Results:

Table 1 reports estimation results of the above model at the multivariate level of analysis using collected data from 580 respondents. The results indicate that all the variables in the model are significant. Hence, the designed model is statistically dependable and can be used in analyzing the relationships between the criterion and predictor variable sets and further analysis is feasible.

Table 1
Multivariate Tests

Effect	Pillai's Trace		Hypothesis df	Error df	Sig.
	Value	F			
Intercept	0.050	6.621	4.000	508.000	0.000
FIRMNUM(PHASE)	0.625	3.156	120.000	2044.000	0.000
PHASE	0.528	27.234	12.000	1530.000	0.000
JOB	0.236	5.346	24.000	2044.000	0.000
PHASE * JOB	0.188	1.396	72.000	2044.000	0.017
X5DATA	0.073	9.983	4.000	508.000	0.000
X5GOODIT	0.264	45.630	4.000	508.000	0.000
X5SUPPRT	0.027	3.582	4.000	508.000	0.007
X7ENVIRO	0.045	6.047	4.000	508.000	0.000
X8PRTCP	0.261	44.770	4.000	508.000	0.000
X9USEREX	0.066	8.933	4.000	508.000	0.000
X9PROTYP	0.078	10.775	4.000	508.000	0.000
X10COMIT	0.535	145.919	4.000	508.000	0.000
X13RESPN	0.122	17.725	4.000	508.000	0.000
X16EXECS	0.220	35.814	4.000	508.000	0.000
X17PROCS	0.072	9.825	4.000	508.000	0.000

Between-Subjects Effects:

Table 2 reports the result of testing the between-subjects effects. Not all relationships between X and Y variables (or categorical factors) are significant.

First, the influence of the interaction between respondent's job position and DW phase of development on the system success is only significant at the adaptation phase. This suggests that not only the respondents' job positions play an important role on their perception of the DW success at the adaptation phase of the DW project, but this role depends also on the development phase of the DW they use.

Second, firms within DW phases of development (FIRMNUM (PHASE)) have significant impact on the DW success at the initiation (YINIT), adaptation (YADAPT), and infusion (YINFUSE). At these particular phases, the effect of the DW phase of development on the system success differs considerably from a firm to another.

Third, the DW phase of development has significant influence only on success at the adaptation phase (YADAPT).

Fourth, job position is significant in its relationship with DW success at all system phases' development.

Fifth, data management (X5DATA) has significant effect on DW success at the initiation and adaptation phases. Good IT (X5GOODIT), user parntnership (X8PARTCP), and oriented DW toward executive use (X16EXECS) significantly influence the system success at all its phases of development. System reliability & support team responsiveness (X5SUPPORT) and external industrial environmental pressures (X5ENVIRO) significantly affect the system success at the "acceptance & routinization" and infusion phases. End-user involvement and expectations (X9USEREX), prototyping (X9PROTYP), responsibility for the system (X13RESPN), and clarity of procedures (X17PROCS) have significant influence on the system success at the "initiation & adoption", adaptation, and infusion phases.

Management commitment (X10COMIT) has significant impact on system success at both the adaptation and "acceptance & routinization" phases.

Table 2
Tests of Between-Subjects Effects

Source	Dependent Variable	F	Sig.	Source	Dependent Variable	F	Sig.
Corrected Model	YINIT[a]	25.901	0.000	X8PRTCP	YINIT	52.357	0.000
	YADAPT[b]	26.723	0.000		YADAPT	10.218	0.001
	YACCEPT[c]	42.708	0.000		YACCEPT	33.804	0.000
	YINFUSE[d]	5.663	0.000		YINFUSE	17.085	0.000
Intercept	YINIT	2.288	0.131	X9USEREX	YINIT	4.670	0.031
	YADAPT	20.936	0.000		YADAPT	5.013	0.026
	YACCEPT	6.852	0.009		YACCEPT	1.952	0.163
	YINFUSE	1.593	0.207		YINFUSE	18.881	0.000
FIRM NUM(PHASE)	YINIT	3.993	0.000	X9PROTYP	YINIT	11.776	0.001
	YADAPT	2.424	0.000		YADAPT	27.818	0.000
	YACCEPT	1.378	0.090		YACCEPT	0.044	0.834
	YINFUSE	3.085	0.000		YINFUSE	9.493	0.002
PHASE	YINIT	0.844	0.470	X10COMIT	YINIT	0.001	0.974
	YADAPT	158.815	0.000		YADAPT	23.984	0.000
	YACCEPT	1.845	0.138		YACCEPT	327.996	0.000
	YINFUSE	1.697	0.167		YINFUSE	3.442	0.064
JOB	YINIT	4.635	0.000	X13RESPN	YINIT	10.717	0.001
	YADAPT	4.933	0.000		YADAPT	27.121	0.000
	YACCEPT	2.721	0.013		YACCEPT	0.158	0.691
	YINFUSE	5.218	0.000		YINFUSE	30.285	0.000
PHASE * JOB	YINIT	1.210	0.247	X16EXECS	YINIT	45.722	0.000
	YADAPT	2.060	0.006		YADAPT	15.138	0.000
	YACCEPT	1.000	0.458		YACCEPT	10.313	0.001
	YINFUSE	0.636	0.872		YINFUSE	12.573	0.000
X5DATA	YINIT	18.211	0.000	X17PROCS	YINIT	7.769	0.006
	YADAPT	11.170	0.001		YADAPT	14.010	0.000
	YACCEPT	0.280	0.597		YACCEPT	0.007	0.935
	YINFUSE	0.206	0.650		YINFUSE	24.720	0.000
X5GOODIT	YINIT	31.583	0.000				
	YADAPT	27.743	0.000				
	YACCEPT	54.339	0.000				
	YINFUSE	14.823	0.000				
X5SUPPRT	YINIT	3.527	0.061				
	YADAPT	0.009	0.923				
	YACCEPT	11.069	0.001				
	YINFUSE	8.380	0.004				
X7ENVIRO	YINIT	1.821	0.178				
	YADAPT	2.691	0.102				
	YACCEPT	7.913	0.005				
	YINFUSE	6.426	0.012				

a R Squared = .775 (Adjusted R Squared = .745)
b R Squared = .781 (Adjusted R Squared = .751)
c R Squared = .850 (Adjusted R Squared = .830)
d R Squared = .430 (Adjusted R Squared = .354)

Parameter Estimates:

In order to investigate this behavior in more detail, one should look into the parameter estimates. Literature review, expert interviews, and statistical analysis reported in previous section led to the choice of two sets of variables (dependent and independent.) Regression parameters generated by the GLM procedure will be discussed in light of statements of prior expectations concerning the parameters of the model. Table 3 presents the results for estimating X constructs' parameters.

Most of the independent covariates estimated parameters are positive, suggesting a positive relationship; only few are negative. Also, most of these parameters are significant at ($p < 0.05$) level indicating strong relationship between these constructs and DW success at various phases of development.

Table 3
Parameter Estimates – Convariate Terms

Dependent Variables	YINIT	YADAPT	YACCEPT	YINFUSE
Intercept	0.504	-1.235 *	0.338	0.893
X5DATA	0.183 *	0.169 *	0.020	-0.036
X5GOODIT	0.173 *	-0.191 *	0.198 *	0.221 *
X5SUPPRT	0.061	0.004	-0.095 *	-0.177 *
X7ENVIRO	0.052	0.075	0.095 *	0.183 *
X8PARTCR	0.172 *	-0.090 *	0.121 *	-0.184 *
X9USEREX	0.061 *	0.074 *	0.034	0.228 *
X9PROTYP	-0.085 *	0.154 *	0.005	0.143 *
X10COMIT	-0.001	0.238 *	0.653 *	-0.143 *
X13RESPN	0.090 *	0.169 *	-0.010	0.283 *
X16EXECS	0.205 *	0.139 *	0.085 *	-0.201 *
X17PROCS	-0.070 *	0.111 *	0.002	0.234 *

* Significant at 0.05 level.

Results for the Hypotheses

DW success at the initiation phase is positively affected by six characteristics – data management (X5DATA), suitability of IT (X5GOODIT), user partnership (X8PARTCP), end-user involvement & expectations (X9USEREX), responsibility for system (X13RESPN), and DW aimed at executive use (X16EXECS). This supports hypotheses 1a, and 3a.

At the adaptation phase, DW success is positively influenced by seven characteristics – data management (X5DATA), end-user involvement & expectations (X9USEREX), use of prototyping (X9PROTYP), management commitment (X10COMIT), responsibility for system (X13RESPN), DW aimed at executive use (X16EXECS), and clarity of procedures (X17PROCS). This supports hypotheses 2b, and 3b. There are two characteristics that need careful handling at this phase: suitability of IT (X5GOODIT), and user partnership (X8PARTCP) because of their negative impact on this phase success.

However, success at the acceptance & routinization phase is positively affected by the following five characteristics – suitability of IT (X5GOODIT), industrial environmental pressures (X7ENVIRO), user partnership (X8PARTCP), management commitment (X10COMIT), and DW aimed at executive use (X16EXECS). This result supports hypotheses 1c, and 2c. Only responsiveness of IT and support team (X5SUPPRT) needs careful attention at this phase because of its negative effect on success.

Still, success of the DW at the infusion phase is positively influenced by the following six characteristics - suitability of IT (X5GOODIT), industrial environmental pressures (X7ENVIRO), end-user involvement & expectations (X9USEREX), use of prototyping (X9PROTYP), responsibility for system (X13RESPN), and clarity of procedures (X17PROCS). This result supports hypotheses 3d. Three characteristics have negative influence on success at the infusion phase: responsiveness of IT and support team (X5SUPPRT), user partnership (X8PARTCP), DW aimed at executive use (X16EXECS) and require careful treatment.

Significant Corporate Cultural Factors that affect the DW Success across Different Phases of Development

The results show that user partnership (X8PARTCP) is important determinant of success across all DW development phases.

User parntnership (X8PARTCP) reflects users, management, and IT group partnership in adopting and managing the system. Results reveal that user partnership has positive effect on the DW success at both the "initiation & adoption" (YINIT) and "acceptance & routinization" (YACCEPT)

phases. Unexpectedly, user partnership has negative effect on the DW success at both the adaptation (YADAPT) and infusion (YINFUSE) phases.

Management commitment (X10COMIT) has positive effect on the DW success at the adaptation (YADAPT) and acceptance & routinization (YACCEPT) phases.

Responsibility for the system (X13RESPN) has positive impact on the DW success at the initiation & adoption (YINIT), adaptation (YADAPT), and infusion (YINFUSE) phases. It reflects system users' preference between three choices of handling responsibility for the system: to allocate it to the business division that generates the data, assign it to the functional area, or share it among all users.

DISCUSSION

Based on an intensive international comparative study of key issues in information systems management, Watson, Kelly, Galliers and Brancheau [120] have suggested that national culture and economic development can explain substantial international differences in these key issues. At the macro level of analysis, researchers suggest that, as a nation progresses through different stages of economic and IT development, the relevant key issues should change from infrastructure issues to operational issues, and finally to strategic issues. On the basis of economic development, the UAE, a GCC member country, is a developing country with issues driven more by operational needs.

Although, the GCC countries, including the UAE, did not become economic powers until the late 1970s, they have invested heavily during the last two decades in technological infrastructure. The key concerns of the GCC illustrate a mixture of issues. The top issue is improving MIS strategic planning, followed by improving information security and control. Furthermore, organizational learning and the use of IS technologies are important as IT revolutionizes the way firms operate [120].

The overall conclusion of the results in Table 3 supports the existence of this mixture of issues. While some of the above cited significant considerations are strategic in nature (e.g., industry environmental pressures – X7ENVIRO, and top management commitment - X10COMIT), others are operational (e.g., data management - X5DATA, responsiveness of IT and supporting team - X5SUPPRT, use of prototyping - X9PROTYP, and responsibility for the system – X13RESPN).

Main Effects and Interactions

Two main effects are considered and have been proven important: the DW phase of development (PHASE) and user job position (JOB).

Effect of the Interaction between the DW Phase of Development and User Job Position (PHASE*JOB):

At the multivariate level of analysis, the interaction effect between both DW development phase (PHASE) and user job position (JOB) on the DW success appears significant.

Tests of between subjects effects show that this interaction effect on the DW success is significant only at the adaptation phase (YADAPT). This means that the effect of the DW adoption & diffusion phase on the DW success at the adaptation phase depends on the effect of the user job position.

The wisdom of the above statistical result is that if firms seek to maximize the DW success, they should investigate the critical issues that the adoption & diffusion phase of their DW presents as evaluated by their users of different job positions. It is not enough to address the DW adoption & diffusion phase problems without considering what these problems mean to the system users. Each of these phases has its benefits and problems that may be weighed differently by each of the system users. Success of the DW at the adaptation (YADAPT) is more sensitive to this interaction more than at any other adoption & diffusion phase. As such, the development of DW warrants higher level of caution and planning.

Effect of DW Development Phase (PHASE):

Related literature recognizes the functional parallelism between IS implementation and adoption & diffusion of technological innovation [28] [58] [76]. Empirical and non-empirical studies related to organizational innovation and IS implementation have identified adoption & diffusion phases characteristics as major forces that contribute to successful efforts to introduce technological innovations into organizations [64].

At the multivariate level of analysis, the effect of the DW development phase (PHASE) on the DW success is significant.

Further investigation of tests of between subjects effects for the same factor identifies (PHASE) as a significant factor that affects the DW success at the adaptation phase (YADAPT). This means that each of these phases generates different benefits and problems that might influence its success. Understanding these possible benefits and problems should constitute the first step that management should make in order to decide on how to increase the effects of any possible DW phase benefits and reduce the effect of any probable DW phase problems. This finding agrees with Kwon and Zmud [64], Cooper and Zmud [15] and supported Cash et al. [11] that organizations must understand and manage their implementation processes in order to maximize the benefits from IT investments.

Effect of Job Position (JOB):

Job positions have different involvement rates in managerial activities. Conceptual literature proposes a positive impact of broader involvement in managerial on adoption [16] [61] [73].

At the multivariate level of analysis, the effect of job position (JOB) on the DW success appears to be significant.

Tests of between-subjects effects indicate that differences in DW success at each of each of the four phases of development are significantly explained by (JOB.) The practical implication of such a result is that if organizations seek to increase their individual DW success at any of the four phases of development, they should investigate their staff's perceptions about their individual DW systems. They should identify these individual job positions' perceived DW benefits and problems. The concept here is that there is no such unified perception of the individual DW in use; rather every job position has its own different perception of the system. It is important for the organization to manage these perceptions and beliefs. Increasing of the DW success depends on making the best of these benefits and taking care of these problems. This finding agrees with Little [70] that there are significant differences between primary constituents in their perception of the factors that influence the implementation of the DW. This finding confirms the findings of Cameron [10]. Related literature acknowledges also the different effect of an information system users' managerial level (grouping) on the system success [102] [44], a variable closely related to job position.

Effect of the Firms Within DW Development Phases (FIRMNUM(PHASE)):

At the multivariate level of analysis, the within impact on the DW success is significant. It means that there is a sufficient evidence to reject the null hypothesis that there is no difference in average DW success for firms which relate to the same phase.

Tests of between subjects effects reveal that this effect constitutes significant impacts on DW success at each of the initiation (YINIT), adaptation (YADAPT), and infusion (YINFUSE) phases.

Covariates Effect

The researchers have explicitly stated their expectation to arrive at different sets of independent variables that each may be more important than the others in explaining the DW success at each of the different phases of DW development. The acceptance of the fact that some variables are important in a particular system implementation may be totally different from variables determined to be important in other systems or applications is beginning to be acknowledged by some researchers [10] [64] [70].

Typically, managers who are concerned with planning the development of a particular DW system would not focus their attention on one or two variables. They would usually device a plan to manage this development. This plan is multifaceted and multivariate. It is only when a pattern can be discerned in a large number of variables that it is possible to describe or define a particular firm's DW development plan. For this reason, the attention here is focused on groups of variables, which together describe major components of the total plans of the UAE companies' DW development. Organization variables will be discussed first followed by system appropriation variables.

Generally speaking, most of the variables included in this section of the current study were subject to investigate in other studies. Most of these studies have examined the effect of a single organizational variable on an IS's success (e.g., [103] [86] [115] [27] [89], to name a few). Few studies have endeavored to explain the relationships between organizational variables and IS success employing integrative models (e.g., [44] [24] [34] [98] [64] [15] [61]).

Corporate Culture & Organizational Climate Characteristics

It is widely accepted that corporate culture affects success of the management of computer-based information systems [107] [69] [120].

A popular literature on corporate cultures, following Peters and Waterman [85], insists that shared values represent the core of a corporate culture. Hofstede, Heuijen, Ohayv, and Sanders [51] have demonstrated that shared perceptions of daily practices to be the core of an organization's culture. Related literature found that strong culture does not ensure success unless the culture is one that encourages a healthy adaptation to the external environment, including new technology [63].

User Partnership (X8PARTCP):

The IS theory [108] and DW advocates [53] have recognized the importance of establishing partnership between management, and-users, and IS personnel on the IS success. This partnership coupled with cooperation between these three groups are considered an effective approach to overcome resistance to change.

At the multivariate level, user partnership (X8PARTCP) is significant in its association with DW overall success. Tests of between subjects effects, however, show that user partnership constitutes a significant influence on DW success at all phases of development.

Above results are in agreement with the results obtained by Davis et al. [20], Inmon and Hackathorn [53], Guimaraes et al. [44], and Amoroso and Cheney [3].

Analysis of estimated parameters reveals that although user partnership (X8PARTCP) has positive relationships with DW success at the initiation & adoption (YINIT) and

acceptance & routinization (YACCEPT), it has negative relationships with DW success at the adaptation (YADAPT) and infusion (YINFUSE). Users, management, and IT group are not co-operating in adopting and managing the DW. Adopting the system is supposed to take place in the "initiation & adoption" phase. Concluding the adaptation phase, a firm should have a ready-to-go system to manage and further develop. This calls for expanding the system, inducing people to commit to it, encourage them to use it as a normal activity, develop its applications, and resolve integration issues. The objective here is to have a scalable, workable, flexible system that may be considered a corporate asset, change the way users do their work. Subjects do not perceive this co-managing aspect as sincere at minimum.

Management Commitment (X10COMIT):

Both formal and informal organizational structures influence the introduction of technological innovations [121] [21] [111]. Much research has investigated the effect of formal structural factors on innovation, especially regarding initiation & adoption behaviors [64]. The current study concentrates only on the formal structural aspects of the DW innovation at different development phases.

It has been argued that the organizational setting characteristics significantly influence information systems adoption behavior. Certain features of organizations themselves either facilitate or encourage adoption of innovation.

Management support is repeatedly cited in the related literature as a vital consideration on successful implementation of information systems. At the multivariate level of analysis, management commitment appears significant in influencing the DW success. This finding agrees with many studies [70] [87] [44] [25] [10]. Univariate statistical results showed that management commitment (X10COMIT) has significant influence on the DW success at the adaptation (YADAPT), the acceptance & routinization (YACCEPT), and the infusion (YINFUSE) phases. It did not have such significant effect on the DW success at the initiation & adoption (YINIT).

Analysis of estimated parameters shows that although management commitment (X10COMIT) is positively associated with both the DW success at both the adaptation (YADAPT),and the acceptance & routinization (YACCEPT). However, management commitment (X10COMIT) is negatively associated with the DW success at the infusion (YINFUSE) phases. This finding may be explained in terms of the system growth pains and management search for control. If IS management is incapable of handling the system integration problems, usually management tends to issue many new rules to achieve more control over the use of the new system then the system suffers. It becomes difficult for the system to be employed in organizational work, and for the organizational systems to adjust to account for the DW, and for the DW to be used within the organization to its fullest potential. It seems somewhat reasonable to assume that the UAE large firms that acquired DW systems and reached the infusion phase of diffusion are subject to some of these integration problems. The impression here is likely that management commitment is expected to get weaker as the system development completes. Full operational, executive, senior, and top management support normally shift their attention and support to other projects as the first project concludes.

Management commitment does not have significant association with DW success at the "initiation & adoption" (YINIT) phase. This relates to novelty of the DW technology. One does not expect that all management members in a developing country such as the UAE, especially top management, to be aware of the DW technology, their firms' need to employ such a technology, and how much support it takes to develop. As such, it is not unusual for them to allocate needed funds on demand and wait until situations develop where their managerial support is needed. Normally, there would be very few problems that require their intervention at the initiation & adoption phase.

Responsibility for the system (X13RESPN):

Certain values and ethics are common and acceptable throughout many organizations, thus they direct this organization members' behavior towards the DW system [18]. Responsibility for the system, its data, and procedures are controlled by these ethics and values.

Multivariate tests indicate that responsibility for the system (X13RESPN) has significant impact on the DW overall success. This means that firms ought to plan for this partnership if they seek to increase the likelihood of their systems success. However, tests of between subjects effects reveal that responsibility for the system has significant impacts on the DW success at the initiation & adoption (YINIT), adaptation (YADAPT), infusion (YINFUSE) phases.

Generally, organizational behavior literature has proposed or found positive associations between responsibility and infusion phase's performance [45] [114] [43].

Analysis of estimated parameters reveals that although responsibility for the system (X13RESPN) has positive impact on the DW success at the initiation & adoption (YINIT), adaptation (YADAPT), and infusion (YINFUSE) phases, it does not have significant relationship with DW success at the acceptance & routinization phase (YACCEPT). The construct contains three choices of handling responsibility for the system: to allocate it to the business division that generates the data, assign it to the functional area, or share it among all users. Not all three choices have the same impact on all the features of success at the acceptance & routinization phase (expanding the use of the system, encouraging its use as a normal activity, inducing users to commit to its use, modifying the organization work

practices to suit the system, viewing it as an important asset, and changing the way people do their work).

Validation Interviews

A sample of representative respondents of the constituency groups were interviewed for the purpose of validating the study results. Seventy five individuals (13%) of the original study sample subjects (580 subjects) were contacted, however only 41 individuals (7%) have positively co-operated with the researcher. The interviews were administered by telephone calls. The sample members were asked if they are surprised by or agree with the study main conclusions.

Throughout each of these interviews each subject was asked to allow the researcher thirty minutes of his/her time to hear each of the study main results (and their interpretation) and give his/her answer in agree/disagree format. If disagree was the answer, the respondent was asked to give his/her alternative comment.

The overall percentage of validation sample individuals' agreement with the study significant factors that influence the DW overall success ranges between 76% and 100%. The highest overall percentage of agreement corresponded to suitability of IT, management commitment, user partnership, end-user involvement & expectations, and use of prototyping. This is where all constituencies have full agreement with the study results. Yet, the lowest overall percentage of agreement corresponded to clarity of procedures, data management, and responsibility for the system.

Top management has fully agreed with the study results that suitability of IT, industry environmental pressures, user partnership, end-user involvement & expectations, use of prototyping, management commitment, responsibility for the system, and DW aiming at executive use are the most important factors that influence DW overall success. However, end-users have fully agreed with the study findings and top management validation results that suitability of IT, user partnership, end-user involvement & expectations, and management commitment are the most important factors that influence DW overall success. On the other side, IS personnel have fully agreed with the study results that data management, suitability of IT, system reliability & support team responsiveness, management commitment, and DW aiming at executive use are the most important factors that affect DW overall success.

Study Implications

Analysis in the current study demonstrated that the substantial differences in DW success among the UAE firms might be due to organizational factors, system appropriation factors, and the DW stage of development. This implies that these firms need to be extremely cautious when adopting a DW system. Different organizational or system appropriation variables might be more dominant in determining the system success during a development phase than they might be in another.

Implications for Research:

None of the reviewed integrative studies have included any culture-related variables. The current study model encompassed a distinct construct on corporate culture & organizational climate to test their influence on DW success within the study model. Statistical results of this testing showed that culture-related constructs were dominant in influencing DW overall success and explaining differences in this success between different (acceptance & routinization and on-going use) development phases.

This study is valuable to DW researchers because it identifies key areas that organizations need to address in their implementation process.

While most of the variables identified in this particular study are similar to some of the factors identified in the implementation literature, it must be noted that some variables are totally new and have not been previously identified. Additionally, there are major differences in some of the items making up those constructs from those found in earlier implementation studies.

The implication here is that, the current study model is an endeavor to contribute to a contingency theory that to help the implementation efforts with respect to data warehousing. Other researchers may use the current study as a model to achieve contributions with respect to other information systems toward the development of a contingency theory. Appreciating the dynamic nature of IT and the current rate of introduction of new technologies, the development of a normative model that is generally adaptable to any system development may never be possible.

Implications for Practice:

The fact that there is significant effect of DW development phase on UAE firms' data warehousing success as evaluated by their top management, end-users, and IS developers highlights the demanding organizational activity of dealing with relevant implementation-process-related and organizational-behavior-related aspects of DW implementation.

On one side, corporate culture & organizational climate aspects should be on the top of the implementation-process-related list.

It behooves top management, end-users, and IS developers in the UAE to carefully consider the factors which contribute to the DW success during the planning stage as well as throughout the entire DW diffusion process on a contingency basis.

Since individuals assuming different job positions in the UAE firms seem to have important effect on the DW success

at different phases of development, there is necessary to invite these parties to increase their involvement in adopting and managing the system. Their expectations should carefully be investigated and their partnership should be encouraged.

CONCLUSION

The current study has built an overall multivariate model that treats the DW success at the different phases of development (YINIT, YADAPT, YACCEPT, and YINFUSE) as a Y vector associated with the same set of factors (PHASE, JOB, PHASE*JOB, and FIRMNUM(PHASE)) and X variables (data management, suitability of IT, system reliability and IT team responsiveness, industry environmental pressures, user partnership, end-user involvement & expectations, use of prototyping, management commitment, responsibility for the system, system aiming at executive use, and clarity of procedures). The model has proven that all its factors and independent covariates have significant influence on the DW overall success.

Multivariate statistical analysis shows that users' perceptions about the DW development phase benefits & problems have significant explanatory power of the system success. More importantly, it shows that the following are the most influential organizational and system appropriation factors that impact the DW overall success: (1) support characteristics (data management, suitability of IT, and system reliability & support team responsiveness), (2) industry environmental pressures, (3) implementation characteristics (end-user involvement & expectations, use of prototyping, and management commitment), (4) corporate culture & organizational climate (user partnership, and responsibility for the system), (5) shared understanding & meanings about the system, and (6) clarity of organizational routines & processes.

Although some organizational and system appropriation issues were important to DW success across all its development phases, univariate statistical analysis (in terms of tests of between-subjects effects) reveals also that some issues are more important to this success at certain phases than at the others. Also, while all of the above-mentioned factors are hypothesized to have positive impact on the DW success at all its development phases, statistical estimation of relationship coefficients indicates that some of these factors may have negative effect on this success at certain development phases.

Focusing on the corporate culture & organizational climate-related variables, DW success at the initiation phase is positively affected by user parntnership, and responsibility for system. At the adaptation phase, DW success is positively influenced by – management commitment and responsibility for system. The impact of user parntnership are negative and hence require careful attention. However, success at the acceptance & routinization phase is positively affected by user parntnership and management commitment. Still, while success of the DW at the infusion phase is positively influenced by responsibility for system, it is negatively influenced by user partnership and management commitment.

Finally, worthy to mention that current study, like all others, is subject to some limitations. Generalizability of the analysis results may be perceived by certain reviewers as limited by variables included in the study model, study sample, items included in survey analysis, and nature of exploratory research.

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