

THE CRITICAL SUCCESS FACTORS THAT EFFECT ON BUSINESS INTELLIGENCE CAPABILITIES IN SAUDI'S PUBLIC SECTOR COMPANIES

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ABSTRACT— *The main objective of this study is to investigate the base use of learning and observational test that connect between the segments of authoritative culture and data administration rehearses towards association business to keep running for everyday execution. The investigation received the exploratory research way to deal with investigating the effect. To implement integrated information systems, centralizing and automating are the most controls in an organization or the company that has a hierarchical structure for its diverse business process entirely in the organization. This study purposed to leverage technology to achieve the highest quality standards, operational efficiency through speedy information delivery on one integrated system to improve the sharing of information across departments and levels. Thus, to search either it's merely able to improve the timeliness of business information update from diverse locations, improve the accuracy of information capture, quality information processing, and reporting and also to set up key performance measures for the company's operational levels.*

Keywords— Integrated Information Systems, Information Systems Management, Performance Measures, high-quality standards.

I. INTRODUCTION

This study is significant research to the Kingdom of Saudi Arabia organizations about information management implementation in each department level. On top of that, this study also beneficial to the business progression in each organization of the effectiveness of information management to deliver the purpose of the organizational goals effectively. For the top management, this research could be able to help them to plan the acquisition of information, data managing it is because information management can be classified as important as to several aspects of business components such as financial management in Ministries, departments and agencies itself. The most important is various reports could be able to analyze and produce reports, for instance, such as capital assets, inventories, financial statements and etc. with accurate, fast, and accessed online. Moreover, this research also could be used by other agencies that use a similar concept of methodology in information management systems.

II. LITERATURE REVIEW

This part is an overview of a network environment for business intelligence on the current technology. The literature reviews the definition of network environment and business intelligence, as well as the components that evolved between them. The literature presented the importance of these components and how they assist organizations in day-to-day activities. These issues have examined the dissimilar risks related with the functioning of the Internet transactions, transfers to the online e-business activities, and the dangers that can affect consumers and consumers in acclimatizing to the new technologies and frameworks. The literature of this scope includes works of the formation of theories of trust, research, reproduction articles, records, and newspapers. The study of present research indicates a large gap associated with drivers from online users, especially over the past five years. The number of study sites and their impact on business intelligence is very small. Research before building a natural flavor of diverse network and business intelligence, but no effort to ensure this component. While references to information showing major gaps in study subjects over the past five years, the study is based on ideas and opinions that strengthen the gap and investigate business intelligence drivers regardless of the network environment within them.

A. Network Environment and Business Intelligence

It is a fact of the inseparability of Social Networks and Business Intelligence. Various social networks along with Business Intelligence allow us to reach a huge number of customers/users at a time, resulting in a variety of data with hidden knowledge. Also, advertising, marketing, the cost-saving can be achieved [1]. The growing nature and use of current social networks are generating highly dynamic data with increasing volume, which is structured, semi-structured, or unstructured data. Moreover, the data is not directly translatable into network-based data that would be useful [2]. This is where the ability to perform effective data mining becomes important. It is a crucial and complicated process of mining data from original information due to the dynamic nature of social networks.

B. Identifying the Challenges of Network-Enabling Devices

The unique benefits of a network infrastructure provided by an integrated business enterprise that is willing to spend the time being crushed by the narrow standard of communication standards and lower costs of their administrative matters. However, unique connections to the network are closely related to the challenge.

Before the coming of boundless systems administration, gadgets conveyed utilizing a standard serial RS-232 or RS-485 interface. In spite of the numerous headways of the PC business, serial interchanges stay entrenched, with an expansive number of off-the-rack and economical equipment, gadgets and programming applications that keep on being composed without systems administration as a main priority.

Serial correspondence was intended to give an immediate association between two gadgets utilizing a point-to-point association that is restricted in link length. It was never intended for long-separate interchanges over a system, to be steered, or to go over the Internet. Essentially, Ethernet isn't prepared to do specifically transmitting serial information starting with one gadget, then onto the next. The difficulties of empowering serial-Ethernet correspondences go well past the conspicuous contrasts in the physical and electrical interfaces. They reach out to the conventions being conveyed over these interfaces.

C. Overcoming the Challenges

There is a basic and a temperate approach to address these difficulties utilizing gadget servers. Sufficiently smaller to fit anyplace, gadget servers and their implanted partners

contain the fundamental segments for conveying a complete system network to basically any sort of serial gadget. Gadget servers ordinarily comprise of a TCP/IP convention stack, remote administration highlights and serial and system interfaces.

At first, the activity of the gadget server may appear to be a clear and basic procedure of associating serial and Ethernet interfaces. Burrow somewhat more profound, be that as it may, and it is discovered that the gadget server's activity does not end at the serial-Ethernet interface, but rather incorporates the moving of serial information over the Ethernet organize—an errand significantly more extensive and more perplexing than simply changing over information between dissimilar interfaces.

D. OLAP (On-Line Analytical Processing)

As indicated by [3], OLAP speak to a type of a multidimensional information examination, which can consider numerous parts of a business issue. Multidimensional answers can be taken a while, for instance, examining the file scope. This alludes to the scope of land regions with specific enterprises. Additionally, with OLAP, one can look into the relatedness of arranging and accomplished outcomes in a specific timeframe. An exceptional component of OLAP is the speed of procuring extremely complex information that covers various factors.

What's more, measurements, as indicated by which the quick computations can be created, are uncertain. Online expository instruments empower various choices extending from the straightforward hunt capacities to complex counts and information demonstrating. OLAP covers numerous business ranges whereupon choices are made. The procedure starts with information, proceeds with data, and ends with business knowledge [3].

E. Business Intelligence and Critical Success Factors

Throughout the years, BI has developed solidly by the improved capacity of data collection and larger storage capacity. Organizations of late use BI to retain a large amount of data at a cheaper rate. This could be in many forms such as the activities of the social media, technology of smartphones, and recordings on the internet. "BI is able to scan through these data to find patterns and trends" [4].

All information is shown through internal services, advertising, customers, suppliers, goods, the economy, and so on. Eleven histories have been available and problems for all practical and economic problems and economic management of installation and decision-making processes [5].

In a study of using information distribution center arrangements [6] found that achievement factors included administration bolster, satisfactory assets, change administration, and metadata administration. [7] Distinguished that snappy execution, capacity to acclimate to business prerequisites, valuable data, and simplicity of route as basic factors in a decent information distribution center procedure. [8] In an overview of 42 end clients found that client fulfillment was essential for the accomplishment of an information distribution center. Others [9], embraced a contextual analysis way to deal with recognizing the authoritative requirements for fruitful information stockroom execution. They distinguished the fruitful hierarchical variables related with execution as; business-driven approach, administration bolster, sufficient assets including budgetary and abilities, information

quality, adaptable venture show, information stewardship, technique for mechanized information extraction strategies/apparatuses, incorporation of the information distribution center with existing frameworks, and equipment/programming confirmation of idea. [10] Contemplated and found that information and framework quality affected information stockroom accomplishment with framework quality being four times as imperative as information quality. They additionally recognized that framework quality was influenced by administration bolster, sufficient assets, client cooperation, and a gifted undertaking group.

F. Business Intelligence and its Architecture

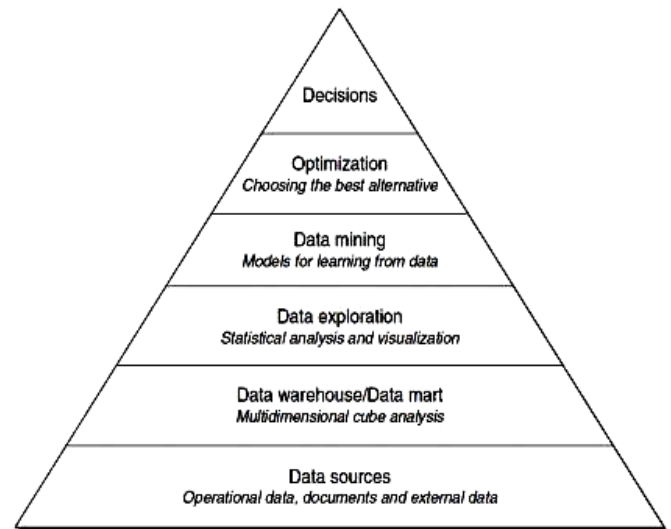


Figure 2.2: The main components of a Business Intelligence System [11]

In the previous figure, the most bottom base is the data sources. These sources usually comprise data that is owned by operationalized systems such as operational data, documents, and external data. Nevertheless, most of the time it also includes unstructured data, such as emails, and data received from peripheral suppliers [11].

On top of data sources, there is a data mart/data warehouse. The function of it is used to merge a number of dissimilar types of data into a dominant location through a procedure identified as an extract, transform, and load (ETL). These data will then be homogeneous across systems. Data marts, on the other hand, are small warehouses that emphasis on information on a sales department, rather than accumulating data from throughout an organization. They limit the complication of files and are less expensive to implement than full warehouses. This level is elaborated as a multidimensional cube analysis.

Then, there is data exploration. Data exploration is an unreceptive BI analysis comprising of inquiry and reporting systems, as well as statistical methods. This level is elaborated as statistical analysis and visualization. After that, there is data mining. Data mining is an active BI methodology that function is to extract information and knowledge from data. It is the model for learning from data. In second place from the top is optimization. The optimization model permits an organization to choose the finest resolution from a set of different arrangements. The best solution would usually be wide-ranging and occasionally unlimited. Lastly, decisions are right at the

top. Decision-makers will then make decisions from available and successfully adopted business intelligence methodologies. Some other elements that will also affect the decision made are the informal and unstructured information available and the use of mathematical models.

G. Reliability and Validity

Reliability levels are what proportions that are perfect and consequently deliver reliable consequences (i.e. Compatibility with the dimension process). This accurately discourages unfavorable steps and encourages consistent results (i.e. Maintaining a rating). If the method frequently produces similar results for each individual or destination with the same value, this device is deemed consistent. The distribution includes storage or repetition, appraisal value, due to result caused by expected test statistic or comparable assessments.

Internal, or homogeneous flexibility, are separate parts or different ways used to measure the use of Alpha Cronbach's strategy. The halfway method is comparing different test scores, and part of a set of devices using the internal compatibility measurement evaluation method. This is the same with equal sides of the toolkit looking for the waiting list. Compare methods that are appropriate for accurate predictions will not follow. Guarantees to ensure fair use of random items from the following relates to or related to / based on one dispersal segment.

III. CONCEPTUALIZATION & DEVELOPMENT OF RESEARCH HYPOTHESIS

This part consists of six subtopics. The first subtopic consists of two major variables which have a dependent variable and independent variable where the readers will

have the ideas and the views for the purpose of this study. The second subtopic is the discussion more further about the independent variables which is each independent variable are elaborated where the purpose of these for the readers will have the general idea or view towards the company where the study was conducted. By contrast, what are the best achievements in the company when using the business intelligence system and what the impact that leads to the business intelligence success factors in terms of company business. On the other hand, this subtopic also stated the hypothesis where readers will have a general idea and views about what is the relationship between dependent variables and the independent variable that the researcher wants to study. The third subtopic is the elaborated of the dependant variable which is the definition of general ideas and views about the main issue aroused that triggers the researcher's interest to conduct the study. In this section also, the main past researcher was mentioned as a reference on how he gets the data previously through the research model variables by his theory. In terms of that, the readers will have a general idea or views about what the researcher wants to study and wants to achieve at the end of the study.

A. The Conceptual of Research

The conceptual framework of the research is presented in figure 3.1 below. There are five (5) Independent Variables and two (2) Dependent Variables. The Independent Variables can be classified as an Infrastructure Related Factor, Team Related Factor, Data Related Factor, Top-Level Support, and Technical People. For Dependent Variables are System Quality and Analysis and Exploration of Critical Success Factors of Business Intelligence. The current framework is Adopted and adjusted from [12,13].

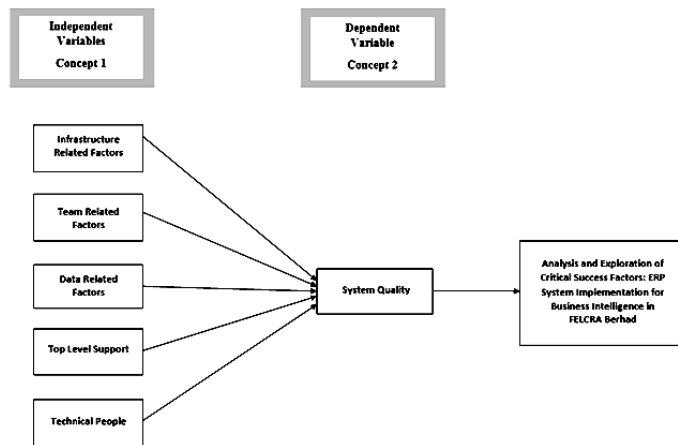


Figure 3.1: The Conceptual of Research, Source: Adopted and adjusted from [12,13].

B. Independent Variables

There are five (5) independent variables in Concept 1 that are interrelated with one another. They are Infrastructure Related Factors, Team Related Factors, Data Related Factors, Top-Level Support, and Technical People. These factors contribute to the System Quality in their own way. Each of them needs to work well without a glitch in order to achieve the Business Intelligence System Quality. How they perform and influence the System Quality results in the Analysis and Exploration of Critical Success Factors: ERP System Implementation for Business Intelligence.

Business Intelligence (BI) plays an important role in organizations of all industries and sizes. It acts as a system that provides historical, current, and predictive views of

business operations. Besides that, it also aims to support improved business decision-making. This is why the BI system can be also known as a decision support system (DSS) in some organizations. It uses technologies, processes, and applications to analyze mostly internal, structured data and business processes while competitive intelligence gathers, analyzes, and disseminates information with a topical focus on company competitors.

IV. RESEARCH METHODOLOGY

A. Population, Sample Size, and Instrumentation

There are 150 employees that have been answered the questionnaire who are 35 of them were from Ma'aden that consists of several departments who as a power of BI user, 30 employees from Jubail United Petrochemical Company,

27 employees from Yansab, 35 employees from NAFCO and 23 employees from SAFCO. In terms of that, 97 employees will be chosen as the sample to become a respondent. The sample is chosen according to the table of sample size for the given population size by [14].

The instrument used for data collection is a Questionnaire to determine the interest of Business Intelligence success factors. The research of questionnaires consists of 7 sections. Section A consists of demographic questions about respondents' personal particular that are related to them. Section B-G consists of questions that seek for each respondents' opinion about both dependent variables and independent variables. The questionnaire includes the questions of Business Intelligence success factors for infrastructure-related, team-related, data related, top-level support, user's involvement, and business intelligence success. For the term of the questionnaire method, the researcher used a 5 Likert scale which produced a survey scale (Likert scale) as a means of measuring all the success factors related.

B. Data Collection Method and Data Analysis Procedure

The questionnaire was used as a method to collect the data. Few types of questions used were close-ended questionnaires. Close-ended questions are profoundly more precise and easy to manage. All questions were asked the respondents entirely and the respondents need for action by making a choice among the sets of alternatives given by the researcher.

For this study, all secondary data were collected from many sources such as books, previous researches, reports from companies, journals, and also internet publications. These sources have strongly contributed to this study with a bulk of information for research and problem-solving.

As for the actual distribution process, the researcher was using the Delphi Study in the first place as a study sampling method where the researcher uses the list of Business Intelligence expert implementation users in the Information Technology Department at *Ma'aden* in Riyadh. The entire respondent was selected from the actual list.

There are three (3) methods of analysis used in this study, which is Descriptive Analysis, Reliability Analysis, and Pearson's Correlation Analysis. Descriptive Analysis of demographic variables was used to figuring out the frequency and percentage of the respondents' profiles. The Descriptive Analysis also was used on independent and dependent variables to figuring out the mean and standard deviation for the counts of the variables. Reliability Test was used to determine how far the questions in the questionnaire are reliable to be asked to the respondents. Pearson's Correlation Analysis was used to figure out the value of the strength of the relationship between the desired variables.

V. ANALYSIS AND PRESENTATION OF RESULT

All of the data were taken from the questionnaire that had been distributed earlier. A total of 241 sets of questionnaires was distributed to several companies that currently use the Business Intelligence and ERP software package as their daily business run. All the departments were included of Information Technology Department, Human Resource Department, Finance Department, Bio-Technology Department, Plantation Department, Top Management level support who are using business intelligence as the main tool to analyze the data in daily

basis which specializes in the organization in Saudi Arabia such as Ma'aden, Jubail United Petrochemical Company, Yansab, NAFCO, and SAFCO. Out of the total questionnaire distributed only 91 sets were returned. The percentage of total returned questionnaires is about 37.75 percent in SAVOLA and Al-RAZI company,

A. Descriptive Analysis - Descriptive Analysis on Demographic Variables

The result of the questionnaire shows that 65.9% of the feedback comes from Male's respondent which is almost more than half of the total correspondents. Meanwhile, another 34.1% of the feedback was contributed by Female correspondents.

A majority of the respondents were in the range of age between 25-34 years old which consists of 61.1%. Meanwhile, the lowest percentage of the respondents were from the age of 55 and above which contributed only 1.4%. Literally, most of the correspondents were from a Bachelor's Degree level, which contributed 40.9% over the total of 208 correspondents. Followed by the second-highest percentage comes from a correspondent at Diploma level which is 38%. While the rest of it contributed moderately by the Master's Degree level by 13.9% and 5.3% from SPM/ 'O' levels. The lowest respondent comes from a correspondent from STPM/ 'A' level, which only contributed about 1.9% over the total.

It can be concluded that almost half of the total correspondent which is 49.5% were from the Executive level. Besides that, the lowest percentage of the correspondent among the others was contributed by Subordinates and other positions which is 3.4%. Meanwhile, the rest of the correspondents were in the position of Senior Management by 3.8%, Managerial by 24.5%, followed by Clerical level by 12%, and finally Technician by 6.7%.

A majority of the correspondents were permanent which consists of 93.3% that is equivalent to 194 correspondent over a total of 208 correspondents. On the other hand, both correspondents with the employment status of Temporary and Others each contributed 1.9% over the total. Finally, 2.9% of the correspondents were Contract staff.

Based on a total of 150 correspondents, 26% of them were using another system for their reporting purpose. Meanwhile, 41.8%, which is most of the correspondent was using SAP system for their business reporting. Last but not least, 67 correspondents which equal to 32.3% were using Tableau system as their reporting mechanism.

The statistics are shown in sum and mean for each category of demographic questions. Educations have shown the highest degree of sum and mean compared to another category and employment status shown a very low degree with 238.00 sums and 1.1442 for a mean. There is no missing data stated for the entire respondents.

B. Descriptive Analysis - Descriptive Analysis of Dependent Variable

The descriptive statistics of the dependent variable which is Business Intelligence Success. Item five (5) has the highest mean which is 2.1683. The question for item 5 is "the processing time is reduced by the use of a Business Intelligence system". It shows that the respondents agree that the Business Intelligence Success implementation in their company and it is very important for the user and the company itself. The lowest mean is item 6 which refers to the question "the accuracy of processing transactions is

improved by the use of a Business Intelligence system?" with 2.0192. It shows that the respondents do not feel that their working areas are suitable to distribute for business intelligence success.

C. Descriptive Analysis - Descriptive Analysis of Independent Variable

Item number 1 has the highest mean with 2.1202. The question for item number 1 is "Aligning business case with the strategic Business Intelligence vision." It shows that the respondents agreed that the infrastructure-related factors is really useful for them to align the business case with the strategic business intelligence vision. Item number 6, with the statement "having an extensible framework to stabilize source/back-end systems" has the lowest mean with 1.8750. It shows that the respondents feel neutral to have an extensible framework to stabilize source/back-end systems in infrastructure-related factors.

D. Reliability Test

The Cronbach's alpha value for the dependent variable which is business intelligence success is 0.922 which indicates that the reliability is very good, and the number of questions asked in this section is 6. The Cronbach's alpha for the first independent variable, infrastructure-related factors is 0.891 which means the reliability of these questions is also very good and the number of questions asked in this section is 6. For variable team-related factors, the Cronbach's alpha value is 0.913 which means the reliability of the questions for this variation is very good and the number of questions asked in this section is 7. The following variable is data related factors, the Cronbach's alpha value is 0.910 which means the reliability of these questions is very good and the question asked for this section is 4. The next Cronbach's alpha value for top-level support is 0.934. It showed that the reliability of the question for this variable is very good. Last but not least, for the fifth independent variable is the user's involvement, the Cronbach's alpha value is 0.922 which means the reliability is also very good and the number of questions asked in this section is 6.

E. Hypothesis Testing

Hypothesis 1

H0: There is no relationship between infrastructure-related factors and data quality

H1: There is a relationship between infrastructure-related factors and data quality

Hypothesis 2

H0: There is no relationship between team-related factors and data quality

H1: There is a relationship between team-related factors and data quality

Hypothesis 3

H0: There is no relationship between data related factors and data quality

H1: There is a relationship between the data related factors and data quality

Hypothesis 4

H0: There is no relationship between top-level support and data quality

H1: There is a relationship between top-level support and data quality.

Hypothesis 5

HA: There is a relationship between a user's involvement and data quality

H0: There is no relationship between a user's involvement and data quality

VI. CONCLUSION AND RECOMMENDATION

The main research objective is to examine the client's conduct and client acknowledgment of utilizing Business Intelligence System in an association. In light of Pearson's Correlation, there is sure a critical connection between User's contribution and Business Intelligence Success, and the connection between them was high positive noteworthy. The second target is to order diverse classification of client impressions of the framework as per the examination demonstrate. In view of Pearson's Correlation, there is sure a noteworthy connection between Team Related Factor and Business Intelligence Success, and the connection between them was direct positive huge. To wrap things up, the third research objective is to guarantee business insight framework usage having the capacity to encourage the clients more powerful and proficiently on working reason for a consistent schedule. In light of Pearson's Correlation Analysis, there is a certain noteworthy connection between Infrastructure Related Factors, and Business Intelligence Success, and the outcome was demonstrated the direct positive relationship between's them. On alternate hands, these destinations had been replied through the relationship table got from Pearson's Correlation Analysis utilizing programming SPSS form 24.

Obviously, the independent variable that most influences the system quality in Business Intelligence Success in Saudis' Organizations is the user's involvement. This is because, according to Pearson's Correlation Analysis table, the user's involvement has shown the highest relationship among other independent variables. Although data related factor has a low positive significant of relationship, this means that business intelligence success has an interest in the variables.

A. Limitation of the Study

Limitation on Sample. The example, the measure was getting just 150 respondents. This number isn't too little yet not very vast which means the outcome might be in direct outcomes. The outcomes may not mirror the association in general, but rather just reflected in a gathering of business insight and ERP clients of workers. A greater specimen size can be gotten yet anyway, it would affect and prompt resistance is normal. There will be an issue to get full collaboration from the representatives on the off chance that they were chosen as respondents.

Data Gathered Regardless of Position. There is by and large having many levels of position contingent upon the measure of organization in Saudi Arabia. In this investigation, the specialist was utilizing the regular position levels, which were senior administration, administrators, officials, administrative level, professionals and subordinates, and others. The survey was conveyed by utilizing stratified inspecting to every individual, in any case, their position in the organization. This may turn into a limitation because of specialist couldn't distinguish whether the factors are more appropriate to be applied to top-level administration or low-level administration.

Variations Studied are Limited. There are five (5) independent variables and one dependent variable studied in this research study which the variables are an infrastructure-related factor, team-related factor, data related factor, top-level support, technical people and

system quality whereby there are many optional variables that could be positively impacted to the Business Intelligence Success in Saudi Organizations. However, the researcher only focused on those five (5) variables only through the entire study after variables goes through the evaluation process by the suitable situation, according to the Saudi organizations' practices and researcher also believes that the variables chosen are more important and significant to the dependent variable to be used.

B. Recommendation

For future researcher is advisable to continue this study in order to determine any other factor that could influence and contribute to the Business Intelligence Success in Saudi Organizations. According to the literature review and the findings, it can be classified that there were many other factors that could affect and influence the Business Intelligence Success by contrast, further research needs to be conducted accordingly.

It is highly recommended for future researchers to use a bigger sample size because a moderate sample size will lead to moderate results findings and limited data information. The future researcher will also be able to conduct research on other variables that could influence the business intelligence success by using another variable that was used in this study. When the future researcher able to overcome all of the constraints and limitations. The result expecting could be improved.

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