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Theoretical Framework of Critical Success Factors (CSFs) for Business Intelligence (BI) System

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***Abstract*—Business Intelligence (BI) is relatively a new evolving research topic, it lacks to develop its own theoretical foundations. This study aims to propose theoretical framework of BI system success which combines together the critical success factors (CSFs) for BI system with quality constructs as a measurements to assess BI success. This study contributes to the body of knowledge by adding a new organizational factors such as user empowerment and organizational structure as a CSFs for BI system.**

Keywords— Business intelligence; BI; CSFs; BI success; theoritical framework.

I. INTRODUCTION

Recently, the Business Intelligence (BI) has attracted much attention among academia and practitioners worldwide as one of the emerging research topics in the area of Information Systems (IS). The IBM Tech Trends Report (2011) indicates that BI is one of top four trends of technology in the period 2010s. During the last decade, organizations around the world are increasingly investing in BI systems to support decisions, improve overall performance, and enhance competitive edge of organizations [1],Despite the benefits that can be achieved from the implementation of the BI system, most of BI projects tend to fail, or they are still in their infancy phase of development [1-5]. A number of researcher emphasized that the key reason for this failure is the lack of understanding the critical success factors (CSFs) that define the success of BI implementation [2-4].

In fact, the implementation of BI is still a new phenomenon, there are insufficient empirical evidences that provide better understanding about what are the CSFs for BI success [2, 5]. Moreover, the implementation of BI systems is not easy task, rather it involves many challenges, drawbacks, risk, and complex processes [5, 6]. Therefore, there is a need to understand the critical success factors of BI that enable organizations to treat complexities, avoid potential risks, overcome the obstacles, and ensure proper implementation of BI systems [1-5, 7] ,Many studies have addressed the CSFs for BI systems [5, 6, 8]. However, these attempts are not at a satisfactory level, and the body of literature still lacks CSFs for BI success [2, 5]. Therefore, there is a massive need to conduct further research to identify more CSFs for BI implementation [2, 3, 5, 6, 9, 10].

While BI is relatively a new evolving research topic, it lacks to develop its own theoretical foundations [2]. The existing BI literature includes a variety of theoretical frameworks that provide slight insights to explain what and how things are occurring whereas there is a huge shortage of conceptual frameworks in it. Many scholars mentioned that there is a need to develop further models that combined CSFs of BI system with other measures that evaluate the success of BI systems [2, 5, 10, 11]. Therefore, this study aims to propose a theoretical framework of BI system success which combines the critical success factors (CSFs) for BI systems implementation. The proposed framework of this study responds to those criticisms regarding lack of BI success measures and CSFs in BI literature, fill the gap existing in the theory by developing a new measure of BI success, and supplements the current limited understanding about both of the measures that assess BI success and the factors affect the success of BI systems implementation that will provide better understanding about the contexts and its factors that affect the BI success which will serve as a guidelines for practitioners that can increase the opportunities of BI system success.

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II. LITERATURE REVIEW

A. Business Intelligence (BI)

The rapid developments and complexity in business globally, along with a constant growth in technological innovations have significantly contributed in generating huge amount of information from multiple sources [12].While the amount of information is available, it does not quite reflect the high level of information quality, or meet the needs of decision making process effectively, thus, this creates considerable challenges in the management of information and causes delay in decision making process[12] . As a result, this explains the emergence and evolution of technology-based information systems which provides a solutions to meet the business needs of valuable information known as *"Business Intelligence"* (BI). Several scholars such as [13] claimed that the BI term was used since the middle of the last century by Luhn's work in 1958; who defined separately the terminology of *"Business"* and *"Intelligence"* as follow [14]:

*"**Business** is a collection of activities carried on for whatever purpose, be it science, technology, commerce, industry, law, government, defense, et cetera. The communication facility serving the conduct of a business (in the broad sense) may be referred to as an intelligence system".*

*"The notion of **intelligence** is also defined here, in a more general sense, as "the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal".*

However, other researchers believe that the BI is relatively new concept coined by Dresner [15] of Gartner Research who described BI as a "concepts and methods to improve business decision making by using fact-based support systems" Dresner 1989 cited in [16]. This definition is in line with definition proposed by Luhn [14] in terms of providing organizations with tools to assist in data management and promote communication among individuals by providing them with required information for their decisions in an effective and timely manner. Some researchers have perceived the BI definition from IT perspective. For instance, Deng and Chi [17] stated that the BI is a techniques and ideas that can be used based on IT applications so as to assist formulate decision making. Meanwhile, Olszak and Ziemba [6] argue that the BI system is a technological and functional tools which include software, architectures, databases, analytical IT tools, and business processes that are used for collecting, storing, accessing, analysing data from different sources and transform it into information and knowledge required for stakeholders to make a well-informed decisions. From the viewpoints of BI vendors, BI can be defined a set of technology and software that provides an integrated, end-to-end Enterprise Performance Management (EPM) system including an operational and functional BI tools and applications, financial performance management software, and data warehousing [18]. According to IBM [19] the BI is an broad umbrella concept which covers all processes of extracting business information from data mass within an organizations environment.

In fact, while there are similarities in some of the above mentioned definitions, differences also occur in many others. These definitions reflect the evolution of BI concept over time along with growing of the technological development. However, most of definitions indicated that the BI concept comprises a variety of aspects including technologies and functions that enable to collect, sort, and analyse data using analytical IT tools that help transforming the data into information and knowledge required for stakeholders to make a well-informed and minute decisions. This consistent with [6] who affirmed that the term of BI should be used to express a wide category of technologies, software, architectures, databases and business processes for collecting, storing, accessing, sorting and analysing data in order to enable the stakeholders obtain the information needed for better operational and strategic decision.

Several academics and IT professionals have discussed the potential benefits that can be achieved by implementing BI systems in different contexts of industries. For instance, Yeoh and Koronios [7] noted that the BI systems contribute to support the decision. It increases productivity [20], and enhances accessibility to information [21]. Moreover, the implementation of BI system develops information quality [1, 22]. It also improves information security [1] and strengthening risk management potential [23]. Some scholars affirmed that the BI system assist in setting well-defined strategies and plans, facilitating to get decipherable and inclusive information, improving decision-making and policy-making processes, eliminating duplication in procedures, providing comprehensive analysis of data to response to clients queries [24]. In addition, the BI contributes to improve service delivery [25] reduce the costs, identify the preferences of clients [26]. Furthermore, the BI projects have a potential to enhance transparency, accountability, and responsiveness to the needs and demands of stakeholders and meet their expectations [24].

As a result, during the last decade, many organizations around the world have sought increasingly to adopt and implement BI systems in order to gain benefits from the BI implementation.[1, 26]. However, the management of BI systems implementation is facing many challenges within organizations worldwide. The implementation of BI is still new trend and involves several varied and complicated processes. It requires significant consideration of identifying the critical success factors which would provide a good guideline in stating the criteria needed in ensuring the success of BI implementation [5-7]. Therefore, this study aims to propose a conceptual framework of the critical success factors (CSFs) for BI systems implementation to provide recommendations to IT decision makers on factors that contribute in overcoming and managing the encountered challenges to ensure proper implementation of BI systems.

B. Measuring the BI Success

DeLone and McLean [27], [28] perceived the IS success as a net benefits which need to be measured to assess IS success. However, the measurement of *"IS Success"* is difficult task [10]. This is due to the fact of IS success is a multifaceted, subject to several measures, broadly controversial, sometimes subjective, and it can be perceived from different perspectives [29].

While the measure of IS success is difficult task, this is quite similar for assessing the success of BI system [10]. Many scholars indicated that the measure the BI success within a specified criteria is almost impossible [10, 22, 30]. According to Adamala and Cidrin [2]the successful BI system is realized based on the positive value an organization achieves from its investment in BI system. Likewise,Olszak and Ziemba [6] argues the BI success is realized when the system achieves the planned goals of business strategy within organization. This implies that how an organization perceives BI success relies mainly on what benefits that organization needs from BI implementation, hence, the measure of BI success is based mainly on the expected benefits from BI implementation which may be differ from an organization to another, even among the similar organizations within particular sector. [3].Therefore, this indicates that there are a variety of perspectives to measure BI success [2, 5, 10]. Therefore, it is so obvious that there is no

agreed measure to assess the BI success [2, 5, 10, 27, 28]. It can be perceived from different perspectives based on the perceived benefits of BI system. However, some scholars further added that the success of BI should be measured based on the research objectives along with the topic under study, as well as considering the potential relationships among dimensions [5, 10].

The researchers have increasingly sought to develop a specific measures to assess the success of BI implementation from different perspectives. Some have developed a measures to assess BI success quantitatively such as profitability or return on investment (ROI), cutting down the operational costs, growing the sales and increasing the market share [31]. While, many others focused on measuring the BI success based on intangible benefits of BI implementation including system quality, information quality, system use, user satisfaction, and process performance [3, 5, 7, 12, 22, 31-33] These studies relied on IS success model suggested by [27, 28] which considers one of the most influential studies to measure IS success. The IS success model includes six dimensions to measure IS success are: System quality, Information quality, Service quality, Usage, User Satisfaction, and Net benefit. According to [28] these dimensions can be used together or separately to measure IS success based on the research context and research purposes. For the purpose of this study, therefore, the BI success is defined as three quality components (i.e. System quality, Information quality, Service quality). The rationales for this selection is that these components are imperative and play a critical role to assess BI success in any context [22].

C. Critical Success Factors (CSFs)

The critical success factors can be defined as *"the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization"* [34]. Likewise, [35] perceived the CSFs as the areas that should be set to make things moving toward the right direction for the business success. A variety of scholars state that the understanding CSFs is a very important aspect for success of BI implementation [2, 5, 6, 9, 10, 36]. Olszak and Ziemba [6] argue that organizations need to realize and learn about CSFs to ensure the occurrence of characteristics and actions affecting the success of BI implementation and put it in the right place, together minimizing negative influences, and planning activities and resources as to achieve the desired goals from BI project which would lead to success ultimately. Additionally, Isik, et al. [3] believe that the reason for BI failure can be attributed to the lack of understanding of the CSFs that define the success of BI implementation, and how those factors contribute in achieving the perceived BI benefits. Yeoh and Koronios [7], further added that the fact of BI system implementation is a relatively new trend driven mainly by IT industry and vendors where there is a lack of empirical investigation of CSFs for success of BI implementation, as well as the implementation of BI involves many complicated processes including technological, organizational and process aspects which need to be understood. Therefore, Yeoh and Popovič [5] stressed that the understanding the CSFs that affect the success of BI implementation is extremely important in order to enable BI stakeholders optimizing their resources and efforts, and avoiding the potential risks and obstacles facing implementation by concentrating on those CSFs that are most likely to assist successful BI system implementation and achieve the system objectives.

The IS literature abounds with several studies that identify many CSFs in different technology-related IS areas such as e-banking [37], Data Warehousing [38], e-healthcare [39], e-learning [40], e-government , customer relationship management systems [35], and enterprise resource planning systems [41]. However, Yeoh and Popovič [5] stressed that the CSFs that apply to other types of IS technology may not necessarily applicable to a contemporary systems such as BI. Therefore, we realized that it is more logical to review relevant studies that addressed the CSFs for BI system.

Numerous studies have recently examined and identified a verity of CSFs for BI implementation from different perspectives. Table 1 summarizes the CSFs for BI system that have been mentioned in the existing literature.

TABLE I. CSFS FOR BI SYSTEM

CSF for BI	References
Top management (commitment, support, championship, and sponsorship).	[4-10, 42, 43].
User participation	[8, 10, 42, 43]
Clear vision and well-defined plan	[4, 5, 7, 9, 10, 42, 43].
Resources	[6, 8]
Appropriate team skills composition	[4-10, 43].
Appropriate resources and technological tools	[6, 8, 9, 36].
Effective data management	[4, 9, 33, 42, 43].
Sustainable data quality and integrity (Representational, Accessibility, Intrinsic, Reliability, integrated, quality and quantity).	[3-7, 12, 30, 33, 36].
System quality (flexibility; reliability; flexibility; usability).	[3, 6, 10, 12, 30, 33, 36].
Integration between BI system and other systems	[3, 6, 12, 30, 33, 36].
Risk management.	[3, 30].
Effective change management.	[4-7, 9, 10].
User access	[3, 30].
Competent BI project manager	[6, 43].
Well-adapted a BI solution with users' expectation and business objectives	[6, 9, 43].
User education and training	[10, 43].
Extensible technical framework (software and hardware) infrastructure	[4, 5, 7, 8, 10, 36, 42].
Effective project management	[9, 10].
Business-driven and iterative development approach	[5, 7].
organizational Culture	[10, 33].
Development methodology	[43].
Meet business needs	[43].
Analytical capabilities	[33].
Well-established business case	[10].
System perceived usefulness.	[10].
System learnability	[10].
Collaboration with supplier	[6].
Well-defined business problem and processes.	[6].
Responsiveness to users' requirements and BI flexibility	[6].

Although there are a variety of studies that address the CSFs for BI systems, they are not at a satisfactory level which indicates that there are still massive CSFs that need to be investigated in different areas of BI implementation [2, 5, 10].

III. THEORETICAL FOUNDATION OF BI SUCCESS

The complexity and versatility nature of BI systems requires developing a solid theoretical basis to ensure the success in its implementation [6]. Yet, the BI literature lacks to develop its own theoretical foundation [2]).Therefore, many scholars have called to develop further models that combined CSFs of BI system with other measures that evaluate the success of BI systems [2, 5, 10, 11]. This section reviews the related theories of BI success and CSFs for BI.

A. IS Success Model

The IS Success Model, which is commonly known as 'D&M IS Success Model', suggested by DeLone and McLean [27] is the most common model and has been widely cited by many BI research to measure the success of BI implementation. DeLone and McLean [27] draw on Mathematical Theory of Communication [44] and Information Influence Theory [45] to develop a taxonomy of their IS success model.

D&M IS Success Model [27]comprises six key components that identify the IS success are: (i) System quality: reflects the system meets the organization requirements such as accuracy, reliability, and response time, (ii) Information quality: the quality of outputs from the system such as reports form value of information, and information characteristics including relevance, accuracy and timeliness, (iii) Usage: the extent to use of system in organization work, (iv) User Satisfaction: the extent to which users are contentment with the system and their interactions with the system, (v) Individual impact: evaluates the system influence on the performance and productivity of individual, and (vi) Organizational impact: reflects the influence of IS on the overall organizational performance such as declining the operating cost, increasing revenues, growing sales, and improving the productivity.

Following the publication of DeLone and McLean [27], many scholars had examined the D&M IS Success Model in different fields of IS and suggested that this model need to be extended to include additional dimensions that became necessary to evaluate success of IS as a result of the evolving nature of IS which have been ignored in the original model [46, 47].

Consequently, in 2003, Delone and McLean [28] modified their model to comprise of Service Quality and Intention to Use as an additional constructs to assess IS success (As shown in figure 1). The modification also included collapsing of organizational impact and individual impact, and replacing them with net benefits in the updated model. These modifications to address some limitations of the original model that IS can affect levels other than organizations and individuals, and to assess the positive and negative impact of user satisfaction and use on IS success.

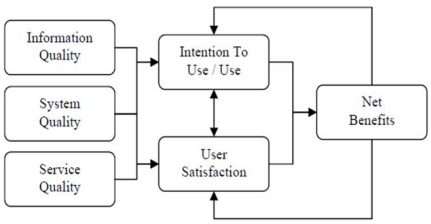

Figure 1: D&M IS Success Model, Delone and McLean [28]

According to Delone and McLean [28], a higher levels of information quality, system quality, and service quality lead to a higher user satisfaction and usage which consequently influence positively on net benefits of IS success for both of individuals and organizations effectively. Thus, the whole process is series of interrelated steps. However, they suggested that the IS success is multifaceted and can be measured from different perspectives based on the context of IS under study, research objectives, and considering the potential relationships between dimensions as well Delone and McLean [28] . Therefore, the entire D&M IS Success Model or a part of it be used as a single measure to assess IS success based upon the context of IS under investigation [27, 28]. They argue that this model should be investigated in a predictive manner, and they also recommended that the researchers should analyse each dimension in their model in order to provide a comprehensive understanding of IS success [28].Therefore, this study identifies the three quality components (i.e. System quality, Information quality, Service quality) as a BI success measurements which are important and play a critical role to assess BI success [22, 48].The D&M IS Success Model, whether in its original or updated form [27, 28], has been widely used as a dominant theoretical basis to measure the success of BI system [4, 5, 7, 22, 49].

Despite the D&M IS Success Model provides a theoretical basis to investigate the BI success, it lacks to the contexts and factors that affect the success of BI implementation [5]. According to Shin [38] ,the most influential model in conducting research on IS success is the model that includes success factors. A number of BI studies firmly asserted that the BI success models should include the critical success factors CSFs [2, 5-7]. This is due to the fact that BI implementation is unlike other traditional systems such as operational or transactional systems, rather it is non-conventional system which involves a complex and diverse processes, and requires an adequate infrastructure and resources [5]. Therefore, the complexity and versatility of BI systems dictates the necessity of developing a solid theoretical foundation by comprising the critical success factors that are imperative to fully capture the underlying specifics of the BI success, as well as give a good basis for understanding what criteria and contextual issues that should be followed to ensure the BI success [5-7]. Consequently, we believe that it is more logical to extend the IS success model suggested by Delone and McLean (2003) by adopting the CSFs for BI implementation to develop a comprehensive model includes all aspects that provide a holistic and meaningful comprehension of the BI success.

B. CSFs Model

Yeoh and Koronios [7] suggest a CSFs framework for implementation of BI systems based on the D&M IS Success Model [27] to develop taxonomy of CSFs for BI implementation. Their framework contains three categories of CSFs that affect BI success which are: organizational, process and technological factors. This framework has been widely used by many researchers to identify the critical factors for BI success [2, 6, 50], Yeoh and Popovič [5] extended their framework with the aim to provide a clearer understanding of the CSFs for BI systems implementation. The updated framework does not come up with a new set of success factors, but it combined the process performance and infrastructure performance dimensions, and labelled them as success criteria. Figure 2 describes the updated framework.

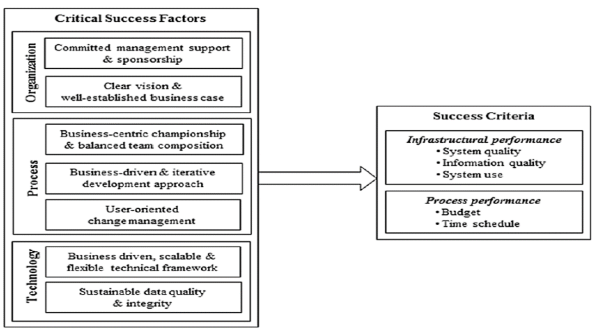

Figure 2: The Extended Framework of Critical Success Factors for Implementing the BI Yeoh and Popovič [5] .

This study adopted Yeoh and Popovič [5] framework in order to provide a better contextual understanding of the CSFs for BI systems and incorporate it with the IS Success Model suggested by Delone and McLean [28]. The next section describes the components of the proposed framework for this study.

IV. THE SUGGESTED FRAMEWORK

This section presents the components of suggested framework for this study. Figure 3 displays the conceptual framework of this research which draws on the IS Success Model suggested by Delone and McLean [28] and extend with the CSFs framework proposed by Yeoh and Popovič [5].

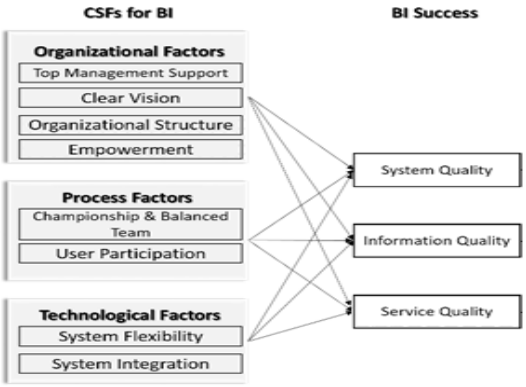

Figure 3: The Research Conceptual Framework based on Delone and McLean [28] Model Extended by the CSFs Framework Suggested by Yeoh and Popovič [5].

The following sections explain the components of this conceptual framework, which are the CSFs for BI system, and then describe the other dimensions of BI success.

A.CSFs for BI

Based on Yeoh and Popovič [5], the CSFs are classified into three major dimensions, namely organizational, process, and technological.

1) Organizational Factors:

a) Top Management Support

The commitment, engagement, and support by top management have been widely recognized by a variety of scholars as an imperative success factor for BI implementation [5, 7, 9, 10, 42, 43].

Several authors stressed that the top management plays a critical role to effectively address change issues that result from implementation of BI system [5-7, 9, 10]. For instance Yeoh and Popovič [5] claimed that the top management can estimating realistically the potentials, benefits and limitations that facing BI implementation. Likewise, Adamala and Cidrin [2] affirmed that the commitment and engagement of top management to support BI projects is an important aspect to ensure the success of BI implementation by allocating the resources, giving administrative approvals required to organizational change, overcoming the obstacles and issues facing this new change in the organization environment. Likewise, Yeoh and Popovič [5] noted that the top management has an effectual influence in encouraging the staff for acceptance of BI system in their actions, breaking down the resistant to change, and enhance their satisfaction with BI system. Thus, if top management is unwilling to support the changes required to BI projects, these systems can't provide a high levels of information quality, system quality, and information quality [49, 51].

b) Clear Vision and Well-defined Plan

Establishing a clear vision and well-defined plan is required during all stages of BI projects implementation [3, 7] It is important to obtain a clear strategic vision and plan in order to alignment the objectives and needs of organization with the BI project and direct the implementation towards achieving the desired goals [2, 5, 9]. It also enables an organization to move toward continuous improvement [4].Many researcher indicated that having a clear vision and well-defined plan is among the CSFs for BI implementation which would ultimately affect the adoption and outcome of the BI initiatives [4, 42]. It enhances the commitment of organizations and individuals with the implementation of BI system, and motivates the users to use the BI system rather than they depend on their own data sources [2].

Yeoh and Popovič [5] argue that the implementation of BI projects is dynamic in nature; which involves many of evolutionary processes that are difficult to predict such as the increasing volume of data size and the growing the number of users which doubling year after year. They also emphasized that the returns of BI implementation should be incorporated into the entire organization processes, thus, a clear vision and well-defined plan is an imperative to identify the potential benefits, costs, time schedule, resources, and expected risks of BI projects [5]. Therefore, having a clear vision and well-defined plan will assist in satisfy the organization's needs, and meet the expectations of different stakeholders from BI implementation [5].

c) Organizational Structure

Organizational structure is a formal framework which governs relationships and internal communication, reporting and information flows, distribute the authorities among employees and tasks with the aim of performing actions and activities within a particular organization [52, 53]. Most previous researches classified the organizational structures into two types which are the centralization and decentralization as a most common forms to assess the extent to which the complexity and flexibility of organizations with respect to tasks, activities, decision-making process and administrative authority [52, 53]. Centralization structure refers to autocracy of authority in decision making process by managers at the top of the hierarchy . In the contrast, decentralization structure is an organizational approach whereby the authority is delegated to managers and other officials at different administrative levels in the hierarchy to make a critical decisions about organization resources .

A numerous studies have suggested that decentralized organizational structure is one of critical organizational factors for IS success they found there is a significant positive relationship between decentralized structure and organization's performance through IS innovations.

In the context of BI implementation, only few studies investigated the influence of decentralized organizational structure as a success factor on BI system. For example, Xuemei Tian, et al. [53] addressed the impact of organizational structure on the effectiveness of BI systems, they revealed that the organizational structure is positively related to the effectiveness of BI implementation. Likewise, Pedyash, et al. [54] examined the influence of organizational structure on BI success using qualitative case study and found the organizational structure plays a vital role in success of BI implementation. They also suggested that there is a need to

further research that investigate the impact of organizational structure as a success factor of BI system.

According to Ismail Al-Alawi, et al. [55], the centralization organization structures are usually characterized by many complicated layers of responsibility which lead to slow down the procedures, hinder information flow and reporting processes which often consume much amount of time to make a decisions, whereas decentralized organizational structure improve the information flow among divisions of organization in an effective and timely manner which ultimately support the decisions-making process. Thus, it is so obvious that decentralized structure improves the organization's performance by taking and implementing the decisions promptly at the action level [53]. Therefore, the decentralized structure enhances the implementation of BI systems effectively which would strengthen the organization's performance by improving communication among customer, employees, and top management and increasing the information availability and accessibility without any obstacles or delay [53].

d) User Empowerment

Empowerment term is an intrinsic motivational construct which focuses on improve the psychological attitudes or perception of individuals about their organizational roles and their work [56]. Empowerment not only involves the delegation of authority, but the most importantly it requires a sufficient training, confidence and information so as to enable an employees to be responsible for their decisions, confident in their abilities, improve their performance, feel that their job actions are consonant with their attitudes and beliefs, and feel that they have an effectual role in organizational outcomes [57]. Thomas and Velthouse [56] suggested a schema for psychological empowerment which includes four cognitive dimensions of individual motivation, namely: meaning, competence, self-determination, and impact.

Many studies suggest that the users empowerment plays a vital role in enhancing the individual performance, supporting change management, increasing the work satisfaction, improving quality of system outputs which would positively affect system implementation to achieve successful business outcomes Although the continued interest in examining the user empowerment as a success factor for user's behaviour, attitudes and satisfaction, the investigation of user empowerment as an enabler factor for BI systems success is still missing in the BI literature. However, a very few studies addressed the influence of user empowerment on the usage of BI system [58], and they found that the user empowerment is positively impact on intention and continuance usage behaviour of BI system. They also recommended to extend the user empowerment in the context of BI systems in order to capture a more complete picture of the relationship between empowerment and BI implementation.

2) Process Factors

a) Championship and Balanced Team

Many studies suggest that having a strong championship and well-balanced team is critical for successful implementation of BI system [5, 7-10, 42, 43]. Championship refers to the BI project team and manager who have a strong leadership, good business acumen, and sufficient business and technological knowledge in order to make BI implementation more a business-centric than technical focus project [5].

As a matter of fact, a BI projects often extend to multiple functional divisions and require extensive efforts, massive data and resources from different business units [2, 30, 33]. Therefore, it should be a strong champions of BI projects to manage the BI system carefully, address the issues that arise during the course of the implementation, promote the collaboration between different business units and BI team, ensure the interaction between the data from transactional systems in different business divisions, maintaining the data, and alignment between the BI implementation and business needs and strategic goals of organization [5, 7].

b) User Participation

User participation is engagement of employees from different organizational level in all stages of BI implementation including tasks, design, and development of BI projects[7, 59]. Several studies indicate that the user participation is among critical success factors for BI systems [6-8, 10, 43, 49]. The users involvement is an imperative factor to enhance the success of BI implementation as it provides a sound base to identify the actual needs of employees and their expectations which ensure that the BI system is designed to be consistent with their real needs and aspirations[10]. Moreover, users participation contributes in alignment between systems design, business needs and goals which consequently lead to the success of BI implementation based on more realistic and achievable objectives [7]. It also assists in managing the expectations of different users, meeting their demands, eliminating the resistance to change, making them more likely to accept the BI in their work, and thus, improving the user satisfaction with the BI system [4, 5].

3) Technological Factors

a) System Flexibility

System flexibility can be defined as "the degree to which a system can adapt to a variety of user needs and to changing conditions [60]. The fact of BI system implementation involves a high level of diversity and technical complexities including tools, processes, software, hardware and the interoperability between BI and other operational systems, as well as among different database levels [6, 49], which usually need to a long period of time to apply during the designing and implementing BI system [49]. Therefore, the BI projects require selection of flexible hardware and software components that enable to conduct an adaptive maintenance to the emerging and ever-changing business needs [4].The system flexibility has been perceived by many researchers as a one of critical factors for BI success [4, 5, 8, 42]. The BI system flexibility enables to accommodate the requirements business needs [5]. It allows for easy expansion of the BI system to be consistent with evolving information needs [4], and improves the quality of BI system and its information by providing more opportunities to add additional data sources, and further analytic tools, and developing benchmarks [12, 60]. In addition, a flexible BI system assists in making the strategic goals of organization to be embedded in the system design which would enables for the building of a long-term BI solution to satisfy the incremental needs of business [5]. Furthermore, the flexibility of BI system enhances the better responsiveness to the needs and demands of users[57], which lead to increase their satisfaction with BI systems [12, 60].

b) Systems Integration

The main goal of BI system is to unify data stored in multiple sources for advanced analysis in order to support decision-making process [5, 36].Therefore, the successful implementation of BI system depends mainly on having an

adequate level of integration among databases, applications, business processes, and operational systems that available throughout different business units [30, 33].
It is widely recognized that the integration of BI system with other systems is one of the critical factors contributing to success of BI implementation in achieving a long-term benefits of organization [30, 33] The level and quality of integration between BI and other systems is an imperative to extract maximum benefits from BI implementation, manage BI performance effectively, and ensure reliable outcomes[3, 30]. Moreover system integration improves information quality by unifying the databases of different applications to be linked with each other using single and standard interfaces [3].

V. THE BI SUCCESS (QUALITY CONSTRUCTS):

The information quality, system quality, and service quality are perceived as a significant predictors of IS [28, 60, 61]. Information quality represents the characteristics of information that being produced by the system and its usefulness for the user[62]. It measures the desirable outputs of IS from information that is perceived as a valuable for a particular purpose or use [60].The IS literature has suggested a variety measurements of information characteristics that identify information quality such as relevance, accuracy, adequacy, availability, completeness, timeliness, conciseness, consistency, format, precision, reliability, scope, uniqueness, understand ability, usability, and usefulness [12, 63] .System quality refers to usability and performance characteristics of system[62].Nelson, et al. [60], noted that the system quality dimension reflects "the user perceptions of interaction with the system over time" (p. 205). Many measures have been suggested by several scholars to assess system quality construct such as convenience, customization, customization, efficiency, accessibility, response time, interactivity, navigation, reliability, sophistication, system accuracy, system features, and flexibility [61, 63].

Service quality relates to the quality of support that the user receive when using the system [62]. The most common measure of service quality in the context of information system is SERVQUAL which proposed by[46]. However, A number of studies suggested other measurements for service quality such as assurance, empathy, flexibility, tangibles, responsiveness, reliability, IS training, intrinsic quality, interpersonal quality. The information quality, system quality, and service quality have been widely considered as a significant dimensions of BI success [2, 5, 7, 10, 12].

several bi models such as [51, 60] limited to address information quality and system quality as a key dimensions to predict the is success. However, the service quality has been widely overlooked in the bi literature as a measure for bi success. several studies stressed that the service quality is among the critical dimensions that affect is success [28]. it has a particular importance in the context of bi system, this is due to the fact that a bi implementation is complex which often leads users to have many queries and need support about the use of is [49]. Hackney, et al. [12] recommended that there is a need to investigate the influence of service quality as a success measure on the bi system. this study contributes to fill the gap in the literature using D&M IS success model [28] by considering the service quality as one of success dimensions of BI system.

VI. CONCLUSION

This study aimed to propose theoretical framework of BI system success which combines the critical success factors (CSFs) for BI systems implementation. The proposed framework has been developed based on IS Success Model suggested by Delone and McLean [28] extended by the CSFs Framework proposed by Yeoh and Popovič [5].
The contribution of this study lies in proposing a theoretical framework which combines together the "CSFs of BI system" with "Quality Constructs" as a measurements to assess BI success. This study also contributes to the body of knowledge by adding a new organizational factors such as user empowerment and organizational structure as a CSFs for bi system.

The suggested framework serves as a roadmap for BI stakeholders who are senior manager, project manager, team members, and vendors in planning, managing, and implementing their BI projects properly by focusing on the identified CSFs of BI systems that provide them better understanding to address issues and concerns related to BI implementation. Moreover, the proposed framework will assist the organizations to direct their resources towards focusing on the specific CSFs. These CSFs will improve their ability to assess the opportunities of BI success that increase the ratio of success and decrease the probability of failure which may be too costly. Therefore, this will enhance the likelihood of bi success, and organizations will gain maximum benefits from their bi system.

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