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Critical Success Factors of Business Intelligence System in Organizations

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Abstract: Business intelligence has accumulated much attention in the last decades, and organizations have invested much money in its operation to make better decisions and achieve a great future. The business intelligence system has made it feasible for more effortless data adaptation. Investigations improve an organization's performance when it arrives at a more valuable insight and improves decision-making. This report presents a systematic literature review on business intelligence and which critical success factors improve the efficiency of the BIS. CSFs for successful BI implementation were examined vastly earlier. The immediate objective of this research is to prioritize the CSF articles for BI implementation success. Using the systematic literature review as the methodology of this report we have investigated the findings of 6 studies and a crucial examination of the specified papers. We discovered that these studies are investigating 344 sub-studies. These 344 sub-studies were carrying into consideration 115 CSF. These factors were shown 796 times in these sub-studies. After analyzing the 115 CSF, we came to the essential CSF, 17 factors, whose weight is 15% of the total factors. The 17 factors were shown 589 times in the sub-studies. The importance of the 17 factors is around 80% of the total 115 factors. The findings of this report motivate BI stakeholders in organizations to concentrate their actions and restricted resources on these 17 essential CSF areas to gain the most significant advantages from the BI system itself.

Keywords: Business intelligence system BIS, BI success, Critical success factors CSFs, Information system success, BI implementation.

العوامل الرئيسية في نجاح أنظمة ذكاء الأعمال في المنظمات

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المستخلص: اكتسب ذكاء الأعمال الكثير من الاهتمام في العقود الماضية، وقد استثمرت المنظمات الكثير من الأموال في عملياتها لاتخاذ قرارات أفضل وتحقيق مستقبل مزدهر. لقد جعل نظام ذكاء الأعمال من الممكن تكييف البيانات بشكل أسهل. وقد أثبتت الدراسات على وجود تحسن ملحوظ في أداء المؤسسات عندما تصل إلى رؤية أكثر قيمة وتحسن عملية صنع القرار. يقدم هذا البحث مراجعة منهجية للأدبيات المتعلقة بذكاء الأعمال وعوامل النجاح الحاسمة التي تعمل على تحسين كفاءة النظام. تم فحص عوامل النجاح لتنفيذ أنظمة ذكاء الأعمال بنجاح بشكل كبير في وقت سابق ولكن الهدف المباشر من هذا البحث هو إعطاء الأولوية للعوامل الأساسية والمهمة التي تساهم بشكل رئيسي في كفاءة ونجاح التطبيق لأنظمة ذكاء الأعمال. باستخدام مراجعة الأدبيات المنهجية كمنهجية لهذا التقرير، قمنا بدراسة نتائج ست دراسات سابقة وتحليلها للوصول إلى العوامل الأكثر أهمية. اكتشفنا أن هذه الدراسات تحقق في ٣٤٤ دراسة فرعية ووجد أنها تحتوي على ١١٥ عامل نجاح تختلف أهيمته باختلاف الدراسة، وعند تحليل هذه العوامل ال١١٥ تبين أن ١٧ عاملاً منها هي الأهم بنسبة ٨٠% من العوامل الأخرى حيث تكررت ٥٨٩ مرة مقارنة ب ٧٦٩ مرة للعوامل ال١١٥ الواردة في الدراسات الفرعية. تحفز نتائج هذا التقرير أصحاب المصلحة في المنظمات على تركيز إجراءاتهم ومواردهم على العوامل السبعة عشر الرئيسية من أجل الحصول على أهم المزايا من نظام ذكاء الأعمال.

الكلمات المفتاحية: نظام ذكاء الأعمال، نجاح ذكاء الأعمال، العوامل الأساسية لنجاح نظام ذكاء الأعمال، نجاح نظام المعلومات، تطبيق ذكاء الأعمال.

Introduction

Decision-makers are in the most sensitive position in any organization. The organization has the right place and direction as much as its decisions are at the right time and function. Nowadays, business is changing rapidly, and the organization should use intelligence tools to follow up with this change. The rapidly developing business world has witnessed numerous advanced information and communication technology breakthroughs (ICT). Business intelligence (BI), data analytics, and big data have become significant research fields. BI systems enable businesses to gain success and expand shareholder value and continuous improvement.

Implementing the BI is a critical point to achieve, and the way to do that has a significant issue if we need to be aware of it. The effectual undertaking and usage of BI are essential for organizational performance. So, the factors contributing to the successful implementation are required and tricky for any organization. These factors of BIS implementation still need to be sufficiently understood, and there are limited contemplations. The current reflections provide a narrow breadth and deepness of investigation with limited scope. Therefore, Critical Success Factors (CSFs) are necessary to obtain an organization's competitive advantage and achieve its business objectives. A complete comprehension of the CSFs lets BI shareholders concentrate their actions and limited resources on these critical factors responsible for BI implementation. Studying these critical success factors within the information management domain becomes necessary. This report seeks to understand and clarify the CSFs for implementing the BI system within organizations which leads to developing the quality of the decisions within the organization.

Problem Statement

The Business Intelligence (BI) Market size will increase from USD 23.1 billion in 2020 to USD 33.3 billion by 2025 at a Compound Annual Growth Rate (CAGR) of 7.6% during the projection period. Many BI projects fail; the failure proportion is between 40% and 80%, depending on the origin, the type of BI project, and the definition of that failure. Because of the poor investigation and research about the success factors, many businesses intelligence (BI) projects fail. The success of BI solutions can be improved if the organization achieves well on specific critical success factors (Garcia, J.M.V., and Pinzon).. Due to a lack of transparent, precise, and blended goals and work analytics, customers need more clarity on what they need or want. This report will focus on investigating and analyzing the critical success factors that will support the organization in any sector in optimizing their resources and efforts to successfully implement the business intelligence system and gain the best value and practice from it.

Research Question

This investigation aims to determine the most significant CSFs affecting BI system implementation. The important question is "What is the Critical Success Factors of Business Intelligence System for Organizations?". Answering this question will give us the road map that different organizations

can use to gain more benefits and success from the BIS. That means effectively using the sources and effort.

Research Objective

The main objective will be to do the best practice on the BIS for any organization by knowing and understanding the CSFs that lead to a competitive advantage. By the end of this report, we will be able to know the most critical success factors of business intelligence that increase the quality of a decision within the organization. Outcomes from the implementation of BI contain improved operational efficiency of processes, a new or improved product or service, and a strengthened organizational intelligence and dynamic organizational structure (Trieu, 2017)

Significant of Research

Business intelligence systems are playing a significant part in boosting different sectors globally. Organizations that use business intelligence systems get more benefits in their sectors (Acheampong & Moyaid, 2016). With the most rapid growth in the business market, organizations should focus on adopting more suitable technologies and strategies that assist them in extending their business sweeping (Bin Hanafi, Muhamad Faizal 2022). From the practical side view, BI system implementation increases profitability and productivity by stemming process duplication and increasing the efficiency of processes (Adjie Eryadi & Nizar Hidayanto, 2020). Organizations in any sector can apply the Business Intelligence system theoretically by applying the information in the available system or the targeted one to gain the best benefits and objectives from the BIS. However, the succus results are not a must. It needs essential factors to achieve it.

We will locate, classify, and analyze previous studies and investigations to identify different CSFs of the BIS. The present research will help explore comprehensive information about the critical factors and how implementing these factors will improve and increase the success of the BI system in the organization.

Thus, the proposed investigation will help study the CSF that can recreate a position in the organization's success. This report desires to synthesize additional research by reviewing current knowledge on CSFs for BI.

Literature Review

The literature-based study showed that the present enterprises must quickly satisfy increasing customer demands and deliver quality products and services. Throughout recent years the competition has increased in all sectors. To have a competitive advantage over the competitors, it is essential to be updated about all the business information for better decision-making (Taneja et al., 2015).

The BI system is used to understand a large volume of data and provides long-term stability for the business to grow (Qushem et al., 2017). Several organizations have implemented the BI system during

the last decade to improve and enhance their decision-making (El-Adaileh & Foster, 2019). In this report, we will take some studies which talk about the critical success factors that are important in the implementation of BIS and analyze, discuss, and conclude the best practice to work on from this review.

Through this study, we analyzed and summarized many research and investigation that talk about the success factors to improve the implementation of the business intelligence system focusing on the newest studies starting from 2018 up to 2022. below is a summary of some studies:

1. Gaardboe, Rikke; Jonasen, Tanja Svarre, in their study "Business Intelligence Success Factors A Literature Review, "which was Published in: the Journal of Information Technology Management in 2018, Have merged the findings of 43 studies after performing a building block search strategy, reference and citation search, and critical examination of the determined papers. A framework of information system success was used to identify the CSFs and analyze how researchers specify information system success.

They discovered 34 CSFs related to BI success. The different CSFs recognized in the extant literature related to project management skills (13 papers), management support (20 papers), and user involvement (11 papers). In the articles with operationalized BI success, they found several distinct factors: system quality (32 papers), net benefits (20 papers), information quality (19 papers), use (14 papers), and user satisfaction (9 papers).

They extend the framework of information system success with four additional factors: vision and strategy, organizational structure, competency development, and organizational culture. In addition, they contribute to the extant research by extending the framework of information system success and identifying gaps in the extant literature. Furthermore, they contribute to practical implementation through an enhanced understanding of the CSFs related to BI success.

2. Florian Eder, Department of Business Informatics - Information Engineering, Johannes Kepler University, Linz, Austria Stefan Koch, Department of Business Informatics - Information Engineering, Johannes Kepler University, Linz, Austria in his study "Critical Success Factors for the Implementation of Business Intelligence Systems "that published in 2018. The article focuses on critical success factors while implementing a business intelligence system. This literature review and essential elements of success dragged. Subsequently, the critical success factors in practice are gathered through qualitative expert interviews and analyzed through qualitative content analysis. The essential factors of success found in the literature compared with those collected during the expert interviews. He found many essential factors of success mentioned in the literature and the expert interviews, such as firm management support, a lightweight approach, user acceptance, the project team, and data quality. In addition, the performance of the business intelligence system, the definition of standards, terminology, and key performance indicators, as well as the institutionalization and integration of business intelligence, were mentioned in the expert interviews.

3. Bahman Moghimi1, * 1 Phd. Academic Staff of School of Administrative Studies, University of Georgia, Tbilisi, Georgia B.Moghimi@ug.Edu.ge in his study "Identifying and Prioritizing Key Success Factors In The Implementation Of BIS By TOPSIS (Case Study: Iranian Small and Medium Enterprises) that published in 2020, he investigates and prioritizes the essential success factors in executing business intelligence systems in small-medium organizations.

There are different studies in various conditions about CSF on BI systems. However, in this paper, he examines and finds the essential efficient factors which could affect small-medium Iranian organizations. This paper investigated CSFs through organization, process, and technology. The related indicators to each factor were identified then the survey on which dependability tested got spread. Finally, the result composed and using tools and free resources pointed to the essential CSFs. After that, the financial asset of CEOs got second place in the importance of CSF.

Specifically, expressing the system implementation benefit and forming a realistic view of the implementation and system functionality were the nearest alternatives to the perfect solution in operation factors. Easy user access to the needed business data got the most points in technology factors.

4. Merin Mathew A dissertation submitted to Auckland University of Technology in partial fulfillment of the requirements for the degree of Master of Business (MBus) in his study "A Literature Review Based Prioritization of the Success Factors of Business Intelligence Systems," which was published in 2021. Organizations use business intelligence (BI) systems worldwide for strategic and operational advantages. However, the successful implementation of BI is an increasingly complex endeavor.

A coherent understanding and prioritization of the critical success factors (CSFs) for successful BI implementation is necessary. Even though CSFs for successful BI implementation have been studied vastly earlier, more emphasis should prioritize on these CSFs. The great aim of this research is to prioritize the CSF themes for BI implementation success. The prioritization of the CSF is based on a systematic literature review.

Thematic analysis was used for the prioritization of the CSF themes. Based on the results of the study, an integrated framework was developed that includes the top three prioritized CSFs for six primary industries: namely, the public sector, financial services sector, manufacturing companies, Engineering Asset Management organizations (EAMO), BI solutions, and the health sector.

This research shows that the top three vital CSFs for successful BI implementation are data quality, management support, and clear vision and BI strategy. The integrated framework offered in this study has contributed to restricting the gap by providing the prioritization of the CSFs for six primary industries. The framework developed from this research would facilitate BI researchers, practitioners, and stakeholders to understand better the prioritization of CSFs accountable for the success of BI implementation.

Methodology

Research Method

The two ways to do the research are quantitative and qualitative. Quantitative research collects and calculates data as numbers (Morgan, 2018). Qualitative research seeks to analyze and communicate perceptions and ideas, discovering the more profound meaning hidden in the data (Morgan, 2018). Qualitative research design is interested in moving rearward and onwards within the different phases and elements of the design to estimate the interactions and relations between one another (Maxwell, 2012).

This report Identified the BI success factors covered in the literature by conducting a systematic literature review which is part of the qualitative principles of the research. We first outline our search criteria. We then present our approach to classifying papers and explain our content analysis and mapping technique. This report reviewed papers published in English between the years 2018 and 2022.

This five-year time was selected to provide the recency of the reviewed reports. It Focuses on the general industries and sectors rather than the specialist ones. Using Google Scholar to search these studies with the title "Business Intelligence Success Factors" in advance search as it should be with the exact phrase. It queried the selected databases, which resulted in 130 records. We filtered the studies to the ones that use the systematic literature review in their methodology for sub-studies. Six studies are the result of this scanning, as shown in the table (1):

Table 1: The Articles Used SLR in their investigation

Year	all result	Used SLR methodology
2018	30	1
2019	26	4
2020	21	0
2021	32	1
2022	21	0
Total	130	6

Many studies are investigating the critical success factors of business intelligence factors from different points of view. Some studies use the new model to analyze the BI success factors in a company. Others use a ready framework. Some researchers are doing a case study in their investigation.

This report has a unique path: we will allocate the best factors from each study of the six investigations, then sort, analyze, and marge them to conclude the most essential and critical success factors that will improve the efficiency of the business intelligence system for any organization and sector. That means we will put the organizations and researchers on the road map of CSFs.

Systematic Review

This report uses a systematic literature review to answer the research question: " What is the Critical Success Factors of Business Intelligence System for Organizations?". A literature review represents

the basis for research studies and aims to advance knowledge. A critical or systematic review's primary goal is to critically analyze previous studies on a broad subject to discover conflicts, differences, or weaknesses (Paré et al., 2015).

The investigator can understand the importance of studies done to date regarding a topic by evaluating existing appropriate works and hence identify limitations and gaps to investigate further (Xiao & Watson, 2019). As mentioned in the research method section, this report will discuss and analyze the studies in table 2:

Table 2: Studies Scope for the systematic review

#	Research title	Researchers	University	Published year	Period taken	Quantities of papers reviewed
1	Business Intelligence Success Factors A Literature Review	Gaardboe, Rikke; Jonasen, Tanja Svarre	AALBORG UNIVERSITY, AALBORG, DENMARK	2018	2008-2017	43
2	Business intelligence system adoption, utilization, and success - A systematic literature review	Noor UL-Ain, Vaia Giovanni, William DeLone	University Ca' Foscari, Venezia, Italy & American University, Washington, DC., USA	2019	2000-2017	101
3	Successful business intelligence implementation: a systematic literature review	Nadeem Ali El-Adaileh & Scott Foster	Liverpool Business School, Liverpool John Moores University, Liverpool, UK and Mutah University, Karak, Jordan	2019	1998-2018	38
4	Business Intelligence Implementation Success Framework: A Literature Review	Haitham Alali, Malek Alharafsheh, Ml Nofal	Amman Arab University, PO box 2234, Amman 11953, Jordan	2019	2000-2015	10
5	The Current Status of Business Intelligence: A Systematic Literature Review	Aqsa Fatima & Cathrine Linnes	Østfold University College, Norway	2019	2010-2018	106
6	A Literature Review Based Prioritization of the Success Factors of Business Intelligence Systems	Merin Mathew	Auckland University of Technology	2021	2001-2020	46
Total						**344**

As we see from the above table, the primary research was for six studies with many sub-studies. The total number of reviewed papers after we finish this report will be 344 papers. Adding to that, the period for the sub-studied papers was from 1998 up to 2020, which means the six primary papers published between 2018-2022 have reviewed 344 papers during the last two decades.

Discussion and Results

Discussion

- Gaardboe, Rikke, Jonassen, Tanja Svarre, (2018). "Business Intelligence Success Factors, " doing a Literature Review of 43 BI success studies conducted between 2008 and 2017, established and recognized the independent variables that affect BI success. In other words, they investigated the determinants of actual BI measurements. The main categories were task, people, structure, and

technology. Each category has many factors included in it then. As shown in the table below, the fundamental success factors were 34 variables as determinants of BI success. They used Petter et al.'s framework to create four new CSFs: Vision and strategy, development of competencies, organizational structure, and organizational culture (Petter, S., DeLone, W., and McLean, E.R.,2013). As we see in table 3, the factors have different weightings and importance.

Table 3: The CSF that discovered within "Gaardboe, Rikke, Jonassen, and Tanja Svarre" investigation.

Main group	Factors	Number of papers shows the factor	Importance	Total for main group of CSFS
Task	Task compatibility	5	2.1%	2.1%
People	Technology experience	5	2.1%	5.8%
	subjective norms	2	0.8%	
	attitudes toward change	2	0.8%	
	Image	1	0.4%	
	Peer support	1	0.4%	
	Visibility	1	0.4%	
	Trust	1	0.4%	
	User expectations	1	0.4%	
Structure	Project management skills	13	5.4%	49%
	Management support	20	8.3%	
	User involvement	11	4.6%	
	IT infrastructure	5	2.1%	
	third-party interaction	6	2.5%	
	IS governance	6	2.5%	
	Developer skill	6	2.5%	
	Development approach	4	1.7%	
	Organizational competence	3	1.2%	
	Organizational size	2	0.8%	
	Organizational culture	7	2.9%	
	Expert domain knowledge	1	0.4%	
	Voluntariness	1	0.4%	
	Management processes	8	3.3%	
	External environment	7	2.9%	
	Vision and strategy	8	3.3%	
	development of competences	7	2.9%	
	Organizational structure	3	1.2%	
Technology	System quality	32	13.3%	43.2%
	Net benefit	20	8.3%	
	Information quality	19	7.9%	
	Use	14	5.8%	
	Service quality	8	3.3%	

Main group	Factors	Number of papers shows the factor	Importance	Total for main group of CSFS
	User satisfaction	9	3.7%	
	Intention to use	2	0.8%	
Total	34	241	100%	100%

The subfactors showed at different times on the papers depending on their significance. The most frequently used was Structure with its sub-factors, followed by the technology, people, and task constructs. The highest factor shown was the system quality, followed by the management support and the net benefit from the technology used. This makes sense because we need support from the top management to guarantee success even if we have the highest quality system and information. The quality of information will surely only add value to the system with this support.

Moreover, they recognized several CSFs requiring further research. In addition, they discussed the factors and their roles as dependent or independent variables. Investigating the relations among variables would be beneficial for improving our knowledge of the factors that affect BI success to support organizations in achieving success and reaching their goals through BI.

Gaardboe, Rikke, Jonasen, and Tanja Svarre conclude that there is a need for better research on the task factor. It could have a better interest. Regardless, the significance of a task most probably affects success, notably because the idea for investing in IS technology is that business analytics can enhance business and decision processes and therefore enhance business performance (Gonzales, R., Wareham, J., and Serida, J.,2015). The argument is that BI increases an organization's current IT portfolio (Chen, H., Chiang, R.H., and Storey 2012). Hence, an exciting study area concerns distinguishing between tasks best resolved with BI versus those needing a different type of IS. Because of that, Gaardboe, Rikke, Jonasen, and Tanja Svarre suggest the following factors to be discussed in future studies: Task difficulty, task independence, task significance, task variability, and task specific.

Adding to that, they talk about some factors that need further notice regarding people's Attitudes toward technology, enjoyment, computer anxiety, self-efficacy, organizational role, education, age, gender, and tenure. The structure factors also need more investigation, like Relationships with developers, IT planning, type of IS, time since implantation, extrinsic motivation, and IT investment.

- Noor UL-Ain, Vaia Giovanni, William DeLone, (2019). Business intelligence system adoption, utilization, and success: A systematic literature review for 101 studies between 2000 and 2017. The selected studies were further analyzed to categorize the main stances and lines of investigation. The first class is the 'organizational perspective,' which explains how aligning organizational goals, strategies, plans, and priorities with the B.I. systems affect adoption, utilization, or success. Within this category, scholars concentrated on factors such as management support, human resources, B.I. (change) management, technology-driven strategy, etc.

The second category, the 'Information system perspective,' highlights IS-related factors such as technological B.I. capabilities (Gartner., 2015), information and system quality (Grublješič, T. and J. Jaklič,

2015), and scalable and flexible I.T. infrastructure 26 (Deci, E.L. and R.M. Ryan, 2022). The third category is the 'users' perspective,' which assumes human-related factors. The analysis informs that human factors are poorly studied to evaluate B.I. system AUS. In summary, most B.I. system studies have focused on identifying organizational or IS-related factors with different perspectives on adoption, utilization, or success.

The examination of 101 studies defined three central regions of investigation adoption, utilization, and success of the B.I. system. This report focuses on the critical success factor of the BIS. Those investigations concentrated on how organizations achieve success through B.I. systems and mainly discussed the success factors and outcomes such as impacts, benefits, and performances. Determined that factors such as B.I. management, data quality, B.I. scope, user satisfaction, and B.I. use are essential for achieving benefits (decision quality and performance) from B.I. tools (Popovič, A. et al., 2012). For example, a study found that users' satisfaction depends on system quality factors such as data locatability, data quality, and system throughput (Kitchenham B. et al., 2010).

Another example applied the I.S. success framework as a means of examining how quality factors (including system quality, information quality, and service quality) donate to the success of the B.I. system (Mudzana & Maharaj, 2015). So, the critical factors related to B.I. success were analyzed by Noor UL-Ain, Vaia Giovanni, and William DeLone, 2019 have different weightings and importance, as below table 4:

Table 4: The CSF that discovered within " Noor UL-Ain, Vaia Giovanni, and William DeLone " investigation.

Main group	Factors	Number of papers shows the factor	Importance	Total for main group of CSFS
Organizational	Management support	6	13%	52%
	Human Resources	9	19%	
	Culture	2	4%	
	Change management	3	6%	
	Service quality	3	6%	
	Strategy, vision, and goals	2	4%	
Information system	Information System Information/Data Quality	9	19%	44%
	System quality	5	10%	
	Perceived Usefulness	1	2%	
	IT integration, infrastructure	3	6%	
	Information and analysis usage, technical readiness of BI	2	4%	
	Data source, type, and reliability	1	2%	
User	Team IT knowledge and technical skills	1	2%	4%
	User Involvement	1	2%	
Total	14	48	100%	100%

The factors for the primary were three perspectives, organizational, information system, and user, were 14 factors, and they were shown in the papers several times depending on their importance.

BI systems are essential for organizations because of their capability to expect and solve problems in a manner that improves organizational decision-making processes, facilitates effective actions, and helps to achieve organizational goals (Hwang, H.-G. et al., 2004). Because of that, the most critical success factors for the BIS were in the organizational group. These factors, such as management support and human resource, gain the highest number of papers.

The next group was related to the information system factors, especially the quality of data used, IT integration, and infrastructure. One good focus for future research would be the individual user, IT competencies, IT-related skills, and IT knowledge. In addition, the BI system's success depends on users (Ngai, E.W., J. Poon, and Y.H. Chan, 2007), so organizations may highlight the development of specific abilities (on users) to discover the system's success and organizational success.

- Nadeem Ali El-Adaileh & Scott Foster, (2019). Successful business intelligence implementation: a systematic literature review, doing this review for 38 studies from 1998 – 2018. This research presents a comprehensive review of possible references about factors affecting implementing BI. Since this study aims to achieve an in-depth knowledge of the type of factors of implementation that other students have placed already, the correct approach is the performance of "content analysis.".

Illustrates commonness statistics for different implementation factors from papers trying to analyze success in implementing BI; the most common implementation factors seen. In the literature, ten implementation factors were conveyed frequently, which may be considered critical factors for implementing BI. The accomplishment of a deep insight into the variety of articles researchers have previously identified led to the ten critical factors that affect the success of applying BIS in any organization.

This report review analyzed and merged the ten subfactors into three main groups and headlines depending on the action and effect of these factors inside the organization. The main categories were organization, technology, and people. Nadeem Ali El-Adaileh & Scott Foster reaches the sub-critical factors after analyzing the 38 articles over 20 years and then taking the highest ranking and weighting from them. Those factors have different weightings and importance, as below table 5:

Table 5: The CSF that discovered within " Nadeem Ali El-Adaileh & Scott Foster" investigation.

Main group	Factors	Number of papers shows the factor	Importance	Total for main group of CSFS
Organization	Management support	29	17%	52%
	Organizational resources	18	11%	
	Vision	16	9%	
	Project manager	14	8%	
	Change management	11	7%	
Technology	Data source system	23	14%	24%
	IT infrastructure	17	10%	
people	Champion	15	9%	24%

Main group	Factors	Number of papers shows the factor	Importance	Total for main group of CSFS
	Team skills	15	9%	
	User participation	11	7%	
Total	10	169	100%	100%

The most critical factors were in the organization group. Management support and organizational resources have the highest importance. Management support was the critical, widely mentioned implementation factor. The variable reflects the level of support that the management presents in announcing, sponsoring, or championing the use of IS and readiness to confirm the sufficient allocation of resources (Petter et al., 2013). Heightened support from the management is the factor that has the most critical for the success of BI; they also reported its controllability. Management support may change significantly over time (Olbrich, S., Poppelbuß, J., and Niehaves, B. 2012).

The organizational resources factor has significant importance in the success of BIS. This term refers to the degree of an organization's technical, financial, and human resources (Grandon & Pearson, 2004). BI systems tend to involve a greater degree of voluntary action, which leads to greater sensitivity to the availability of resources and can be a significant aspect of adopting systems for BI (Puklavec et al. (2014). They were followed by the technology and People categories that have the same importance.

A Business Intelligence system needs good skills and high-tech users to use the data source system and a good infrastructure. Data sources may be characterized as locations where data used in the analysis is stored and from where it is illustrated for use (Hostmann, B. 2007). Data sources used to recover information are technological BI capabilities that may be either external or internal (Harding, W. 2003).

Usually, there has been a reliance of BI upon data that are numerical and structured, that is, measurable upon a numerical ranking which may examine with methods of statistics and the use of computing equipment (Baars, H. and Kemper, H.-G. 2008). There was a critical and essential relation between the data source and team skill in extracting these data. This relation will affect the success of the BIS with importance and critical impact because the guarantee of the virtue and quality of data from the systems from which sourced laboriously impacts BI implementation success (Yeoh, W., Koronios, A., and Gao; J., 2008).

- Haitham Alali,Malek Alharafsheh , MI Nofal, (2019). Business Intelligence Implementation Success Framework. Doing A Literature Review for ten different studies in the period time between 2000-2015. There were about 31 factors covered in these ten studies. The study figured that the main CSFs are infrastructure-related, management and championship, data quality and integrity, team, change management, effective communications, project management, methodology, committed management support, sponsorship ETC. This report review analyzed and merged the 31 factors into three main groups and headlines depending on the action and effect of these factors inside the organization. The main categories were management, user, and software source. After analyzing these

factors, we concluded that they are apparent in many papers and determined as critical factors. Table 6 shows the essential factor and the weightiness of each factor:

Table 6: The CSF that discovered within " Haitham Alali,Malek Alharafsheh , MI Nofal" investigation.

Main group	Factors	Number of papers shows the factor	Importance	Total
Management	Management issues	1	2%	64%
	project management	3	5%	
	well-established case	1	2%	
	Clear business vision	5	8%	
	Business-centric championship	3	5%	
	Technical framework for strategic and extensible planning	1	2%	
	Governance framework	1	2%	
	Flexible enterprise model	1	2%	
	Sufficient resources	2	3%	
	Solution proof of concept	1	2%	
	Extraction tools/methods	1	2%	
	Organizational resistance	1	2%	
	Methodology of development	5	8%	
	Management support	9	14%	
	Change management	6	9%	
user	User involvement	2	3%	19%
	Performance considerations	1	2%	
	Solutions mapping to the users	1	2%	
	Executive sponsor	1	2%	
	User training	1	2%	
	Operating sponsor	1	2%	
	User support	1	2%	
	Team structure/building	3	5%	
	Defined requirements	1	2%	
Software source	Iterative prototyping usage to outline scope and requirements	1	2%	17%
	Data stewardship	1	2%	
	Strategy for automated data	1	2%	
	Integration of existing systems with data warehouse	1	2%	
	Technology fit	1	2%	
	System evolution	1	2%	
	Data quality	5	8%	
total	31	64	100%	100%

This study reviewed relevant studies to explore the essential CSFs for successful BI implementation. The purpose is to use findings on the critical success factors to propose tools for

monitoring and improving BI implementation in organizations. Clear objectives, vision, and a well-established business will have the essential needs to focus on while implementing the BIS.

As we see from table 6, it is crucial to obtain managerial support for BI systems since it is the main factor in all reviewed studies. These studies singled out the matter of users and software sources in line to satisfy the essential factors needed for BIS success. User involvement, software source, and data quality are their essential CSFs because the performance attitude measures the BI use and implementation as it is affected by the BI output and its impact on the organization.

Lastly, the BI implementation CSFs are adequate budget, leadership, business problem and processes, usability, technology, flexibility, system integration, business expectation, users' expectation, culture, experience and cooperation, data quality, skill, effective change management, good communication, project management, top management support, and transparent business vision and plan (Olszak, C.M., and Ziemba, E 2012).

- Aqsa Fatima & Cathrine Linnes, The Current Status Of Business Intelligence: A Systematic Literature Review, 2019. Doing a review of 106 studies between 2010 and 2018 to ensure that the success of BI systems relies on sufficient planning, implementation, and adoption (Clavier, 2014). If organizations do not determine their CSFs, it can negatively affect them since the firm will not be able to deliver to the customer what they value (Cöster, Engdahl, & Svensson, 2014).

The term critical success factors refer to a group of factors impacting the implementation of BI systems and those few essential areas the company must follow to achieve its goals (Hirsimäki, 2017). The new measurement of critical success factor of BI implementation, where culture is separated into four sub-sections: learning and development, participative decision-making, power sharing, and support and collaboration culture (Nasab, S.S., Jaryani, F., Selamat, H.B., Mason, M. (2017).

Cooperation and support within organizations assisted the BI project team during the implementation. They can gain any information that they need from different divisions. This collaboration will only occur if organizations have direct support and collaborative culture. The previous studies' results show a mixture of multi-dimensional CSFs for the BI systems implementation to be successful.

After reviewing the studies, we came to the main category of the CSFs: process, technological and organizational, and all critical factors are a sub of these main groups. Table 7 shows the factors and their groups:

Table 7: The CSF that discovered within " Aqsa Fatima & Cathrine Linnes" investigation.

Main group	Factors	Number of papers shows the factor	importance	Total
Organizational	Management support and sponsorship	8	16%	30 %
	Clear business vision and well-established business case	7	14%	
Process	Business-driven methodology and project management	6	12%	40%
	Business-driven and Iterative development approach	6	12%	

Main group	Factors	Number of papers shows the factor	importance	Total
	Team skills and composition	**8**	**16%**	
Technological	**Sustainable data quality and integrity**	**8**	**16%**	**30%**
	Business-driven, scalable, and flexible technical framework	**7**	**14%**	
total	**7**	**50**	**100%**	**100%**

We can see above that process-related factors are more examined and influential than organizational and technological factors. Process factors are essential to success in BIS, especially team skills and composition. Both technical and non-technical skills are essential in the business intelligence system, and the learning process develops specialized knowledge within a BI project.

Not surprisingly, the composition and skills of a BI team have a significant impact on the success of the implementation of the system. Nevertheless, BI projects are primarily different from other system implementation projects. On the other hand, we can see the importance of Management support and sponsorship as critical success factors related to the organizational segment.

Support from management drove the project forward and supplied the resources, including financial and human, for the success of BI implementation (Nasab et al., 2017). Typically, a committee of a BI systems implementation includes CIO, general managers, functional managers, IT/IS managers, and project managers (Hirsimäki, 2017).

Lastly, Sustainable data quality and integrity are so important to have a great result from the BIS because good outcomes should be started from excellent income. The quality of the system relies on the accuracy of the data. Poor quality data also negatively affect the decision-making procedure. It is important to check data quality from the start of the project, not only for the BI systems but also for the other information systems. Also, the needed data for decision-making usually come from various sources as they are linked to other organizations. Therefore, data integrity is the primary key that leads to high-quality decision.

- Merin Mathew, A Literature Review Based Prioritization of the Success Factors of Business Intelligence Systems, 2021. Doing the SLR for 46 studies during the period from 2001-2020. The main articles include organization and people, BI user satisfaction, technology, process, environment, and culture (Adjie Eryadi & Nizar Hidayanto, 2020). Different studies emphasized that the organizational CSFs are most important than other factors.

The possibility of realizing a successful BI implementation is higher when the organizational requirements are set before other needs in an establishment, such as a technological one (Yeoh & Popovič, 2016). After we analyzed the factors in the 46 studies, we can find 18 factors. This report review analyzed and merged the 18 factors into three main groups and headlines depending on the action and effect of these factors inside the organization.

The most important group was the management, followed by the technology and its details, such as infrastructure and data quality. Lastly, it was about the user and how the organizations prepared them

to be part of the BIS. Likewise, the essential CSFs in the initial phases of the implementation process may vary from the later phases of implementation 46 (Hawking & Sellitto, 2010).

The importance depends on how much they are shown in the Merin Mathew SLR. Table 8 shows the critical factors of the Business intelligence system to success that Merin Mathew reached to it after he did his SLR:

Table 8: The CSF that discovered within " Merin Mathew" investigation.

Main group	Factors	Number of papers shows the factor	Importance	Total
Management	Management support	27	11%	62%
	Change management	14	6%	
	Resources (economic, intellectual, and technological)	16	7%	
	Clear strategic BI vision	17	7%	
	Organizational business culture	14	6%	
	Business-centric championship	17	7%	
	BI strategy	8	3%	
	Strong sponsor	13	5%	
	Project management	7	3%	
	Well-established business case	11	5%	
	System quality	3	1%	
Technology	BI system integration	16	7%	27%
	Information/data quality	29	12%	
	IT infrastructure	6	3%	
	Appropriate BI technology	14	6%	
User	Balanced team skills & composition	12	5%	11%
	User training	10	4%	
	User satisfaction	4	2%	
Total	**18**	**238**	**100%**	**100%**

As we see from the above table, management is the most frequent headline across the studies. The factors in management groups such as Management support, committed management sponsorship, and support enable giving essential resources for delivering software, hardware, financial, and the human condition in the highest ranks (Ravasan & Savoji, 2014).

Many investigations remark that top management support is the essential CSF (Eder & Koch, 2018). Besides, senior management support minimizes employee opposition in enterprise (Ravasan & Savoji, 2014). Another meaningful observation is that multiple studies deliver a ranking of the CSFs, which confirms the significance of ensuring BI implementation success (Adeyelure et al., 2018).

Nevertheless, technology became the second important group, but it has a critical factor: the quality of data came from the essential CSFs. Last, we can see the importance of people using the system. They should be prepared and has a high level of quality and standard. Balanced team skills & composition of users came from the top of the essential CSFs. Adding to that, the interrelationship between the CSFs is a critical topic. It is a significant matter as understanding these exchanges has an essential role in BI implementation success (Gaardboe, R., Nyvang, T., & Sandalgaard, N. 2017).

Results

BI effectively helps operational actions and efficiently combines the existing systems, which results in additional development and creation in different sectors. The use of essential success factors of Business intelligence is the secret to having great implementation and then leading the organization to have all benefits from the BI, such as increasing the quality of the decision.

After reviewing the Six studies, which included 344 sub-studies, we reached the following:

1- 115 factors are the quantity of all factors that have different effects during the implementation of the business intelligence system.
2- The leading Group of these factors was three groups.
3- The importance and essence of the 115 CSF differ depending on how much it shows in these articles.
4- These factors repeated around 796 times.
5- The essential factors were only 17, which repeated 589 times.

Analyzing, sorting, and merging these 115 factors led us to conclude that the essential success factors from these 115 are 17 factors only, which has been shown 589 times in the reviewed literature out of 796 for all factors. The weight of these 17 is 75 % of the total weight.

Meanwhile, this result leads us to Pareto Principle, saying 80% of outcomes (or outputs) result from 20% of all causes (or inputs) for any given event. So, if an organization would like to implement the BIS, it should ensure that these 17 factors are implemented well. Table 9 shows all 115 factors that appear in the 344 studies:

Table 9: All factors that appear in the 344 studies.

Main group	Factors	Number of papers shows the factor	importance
Management	Management support	27	3%
	Change management	14	2%
	Resources (economic, intellectual, and technological)	16	2%
	Clear strategic BI vision	17	2%
	Organizational business culture	14	2%
	Business-centric championship	17	2%
	BI strategy	8	1%
	Strong sponsor	13	2%
	Project management	7	1%
	Well-established business case	11	1%
	System quality	3	0%
Technology	BI system integration	16	2%
	Information/data quality	29	4%
	IT infrastructure	6	1%

Main group	Factors	Number of papers shows the factor	importance
	Appropriate BI technology	14	2%
User	Balanced team skills & composition	12	2%
	User training	10	1%
	User satisfaction	4	1%
Organizational	Management support and sponsorship	8	1%
	Clear business vision and well-established business case	7	1%
Process	Business-driven methodology and project management	6	1%
	Business-driven and Iterative development approach	6	1%
	Team skills and composition	8	1%
Technological	Sustainable data quality and integrity	8	1%
	Business-driven, scalable, and flexible technical framework	7	1%
Management Support	Management issues	1	0%
	project management	2	0%
	well-established case	1	0%
	Clear business vision	2	0%
	Business-centric championship	2	0%
	Technical framework for strategic and extensible planning	1	0%
	Governance framework	1	0%
	Flexible enterprise model	1	0%
	Sufficient resources	1	0%
	Solution proof of concept	1	0%
	Extraction tools/methods	1	0%
	Organizational resistance	1	0%
	Methodology of development	3	0%
	Clear business objectives	3	0%
	Management support	4	1%
	Change management	3	0%
User	User involvement	1	0%
	Performance considerations	1	0%
	Solutions mapping to the users	1	0%
	Executive sponsor	1	0%
	User training	1	0%
	Operating sponsor	1	0%
	User support	1	0%

Main group	Factors	Number of papers shows the factor	importance
	Team structure/building	3	0%
	Defined requirements	1	0%
Software Source	Iterative prototyping usage to outline scope and requirements	1	0%
	Data stewardship	1	0%
	Strategy for automated data	1	0%
	Integration of existing systems with data warehouse	1	0%
	Technology fit	1	0%
	System evolution	1	0%
	Data quality	5	1%
Organization Structure	Management support	29	4%
	Organizational resources	18	2%
	Vision	16	2%
	Project manager	14	2%
	Change management	11	1%
Technology	Data source system	23	3%
	IT infrastructure	17	2%
People	Champion	15	2%
	Team skills	15	2%
	User participation	11	1%
Organizational	Management support	6	1%
	Human Resources	9	1%
	Culture	2	0%
	Change management	3	0%
	Service quality	3	0%
	Strategy, vision, and goals	2	0%
Information System	Information System Information/Data Quality	9	1%
	System quality	5	1%
	Perceived Usefulness	1	0%
	IT integration, infrastructure	3	0%
	Information and analysis usage, technical readiness of BI	2	0%
	Data source, type and reliability	1	0%
User	Team IT knowledge and technical skills	1	0%
	User Involvement	1	0%
Task	Task compatibility	5	1%
People	Technology experience	5	1%
	subjective norms	2	0%

Main group	Factors	Number of papers shows the factor	importance
	attitudes toward change	2	0%
	Image	1	0%
	Peer support	1	0%
	Visibility	1	0%
	Trust	1	0%
	User expectations	1	0%
Structure	Project management skills	13	2%
	Management support	20	3%
	User involvement	11	1%
	IT infrastructure	5	1%
	third party interaction	6	1%
	IS governance	6	1%
	Developer skill	6	1%
	Development approach	4	1%
	Organizational competence	3	0%
	Organizational size	2	0%
	Organizational culture	7	1%
	Expert domain knowledge	1	0%
	Voluntariness	1	0%
	Management processes	8	1%
	External environment	7	1%
	Vision and strategy	8	1%
	development of competences	7	1%
	Organizational structure	3	0%
Technology	System quality	32	4%
	Net benefit	20	3%
	Information quality	19	2%
	Use	14	2%
	Service quality	8	1%
	User satisfaction	9	1%
	Intention to use	2	0%
total	115	796	100%

After analyzing the main and sub-factors, we reach three main groups: management, technology, and users. For each leading group, we sort and merge the essential success factors as shown in table 10:

Table 10: The Critical success factors that appear in the 344 studies.

Main group	Factors	Number of papers shows the factor	importance	Group importance
Management	Management support	94	16%	55%

Main group	Factors	Number of papers shows the factor	importance	Group importance
	Change management	31	5%	
	Sufficient resources	44	7%	
	Clear BI vision	60	10%	
	Business-centric championship	19	3%	
	Well-established case	12	2%	
	Governance	7	1%	
	Business-driven methodology and project management	55	9%	
Information system	System quality	51	9%	27%
	Data quality	51	9%	
	Data source	24	4%	
	IT infrastructure	31	5%	
User	Champion	15	3%	19%
	Team skill & composition	58	10%	
	User training	11	2%	
	User satisfaction	13	2%	
	User involvement	13	2%	
total	17	589	100%	100%

Recommendation

A BI project needs commitment and support from the management throughout the system because circumstances can change over time. The importance of that came from the fact that the BI project needs updating and feedback with unstructured decisions at all system levels. A committee of BI systems should be from a different point of view, such as the technical Team composed & skilled Team should be involved in the BI implementation. The recommendation from this report is that we need to use essential CSF before and during the implementation process. Understanding the organization's critical success factors is necessary to ensure a successful BI implementation process. Also, the outcomes of this report would motivate BI stakeholders in organizations to concentrate their efforts and rare resources on the essential CSF to achieve the most significant advantages from its BI system.

Research Limitation

This systematic literature review has some limitations that are necessary to be mentioned. One limitation of this research is that it is not concentrating on a specific sector, only taking the BI from a general point of view for all sectors and industries. The integrated investigation in this report may be forced to have some sectors and industries in deep and expanded to include other industries and sectors.

Additionally, more studies are needed to discuss human factors' structural aspects (structure and culture). Finally, the effect of using the CSF in developed countries wasn't considered compared with

developing ones. It will be vastly more important to have these details, which aim to see the level of the countries by using the BIS widely.

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