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Article

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Critical Success Factors for BI Systems Implementation and Delivery:
A Systematic Literature Review

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ABSTRACT

Despite the widespread acquisition of business intelligence (BI) systems, their implementation has not always been successful. This study examines the critical success factors (CSFs) that impact the implementation of BI systems in organizations. The systematic literature review follows the guidelines of Kitchenham and Charter's research that was published in 2007. A total of 93 articles published between 2011 and 2021 were analyzed for CSF related to BI systems implementation and delivery. The study identified 56 CSFs linked to organization empowerment & operations, 52 CSFs related to system implementation, and 28 CSFs associated with user enablement. The study found a paucity of research on user enablement in the context of BI implementation and delivery, highlighting a gap in the literature. The findings of this study can help organizations better understand the factors that contribute to successful BI system implementation and delivery, and guide future research in this field.

KEYWORDS

Adoption, Assessment, Business Intelligence, Critical Success Factors, Implementation, Measurement, Success

Business intelligence (BI) systems are critical tools for organizations to improve their operations and decision-making processes (Ravasan & Savoji, 2019). They have numerous potential benefits to companies (Antoniadis et al., 2015; Dobrev & Hart, 2014; Indriasari et al., 2019; Rouhani et al., 2016), better service delivery (Popovič et al., 2019), and improved decision-making. These systems enable managers at all levels to access insightful information accurately and timely using simple tools (Ravasan & Savoji, 2019). BI systems technologies include processes, such as data analytics for processing and analyzing large volumes of data, data querying and discovery, data mining, visualization, warehouse, and artificial intelligence, to support analysis and decision-making (Borissova et al., 2016). Integrating a BI system in an organization helps reorient the organization toward becoming an "intelligent organization," an organization that is capable of acquiring knowledge and utilizing the knowledge to improve efficiency and competitiveness (Tunowski, 2015). Moreover, BI systems support optimal decision-making by helping organizations accurately collect, integrate, analyze, and present information in a timely fashion.

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Successful implementation of information technology (IT) and information system (IS) projects requires an understanding of different critical success factors (CSFs), such as the availability of technology, management support, leadership, and end-user support (Adzmi & Hassan, 2018). The best approach to understanding the implementation of BI is to look into the factors that have to be effectively addressed for a BI implementation project to be successful (Jamaludin & Mansor, 2011). Appropriate leadership during project implementation, as well as support from top management and end users, leads to the successful implementation of IT/IS projects (Adzmi & Hassan, 2018). Strong project leadership brings in strategic thinking, management skills, technical competence, and knowledge that are critical for successful project implementation. The proliferation of BI systems implementation research has created a need to consolidate the findings from these studies in a manner that can inform future BI systems implementation as well as highlight areas for future research.

Accordingly, this study aims to identify, evaluate, and classify the CSFs of BI implementation and delivery as reported in the literature. This is accomplished using a systematic review of the literature that captures and classifies the CSFs reported in prior research. The review classifies the CSFs based on their relations to organization empowerment and operations, system implementation, and user enablement, and identifies any research gaps on each category. Understanding the CSFs is essential for organizations to successfully implement and deliver their BI systems (Mungree et al., 2013; Yeoh & Popovič, 2016). In today's data-driven landscape, BI systems have evolved into indispensable tools that empower organizations to harness their data resources effectively. By extracting actionable insights from vast datasets, BI systems offer a competitive edge, enhanced decision-making capabilities, and the potential to achieve strategic business objectives.

Understanding the CSFs for BI implementation is paramount because it underpins an organization's ability to fully capitalize on the benefits of BI systems. BI systems hold the potential to revolutionize the way organizations operate, enabling them to make data-driven decisions, optimize processes, and respond proactively to market dynamics (Mungree et al., 2013). In a fiercely competitive business environment, the ability to harness BI effectively can be a key differentiator, allowing organizations to adapt swiftly and gain a competitive advantage. Moreover, BI implementation is an intricate process with multifaceted challenges. Identifying and comprehending the CSFs are instrumental steps to streamlining this process (Yeoh & Popovič, 2016), mitigating risks, and ensuring successful outcomes. By emphasizing the significance of these CSFs, organizations can align their resources and strategies effectively, maximizing the return on their BI investments. The systematic literature review (SLR) findings can bolster businesses' understanding of how to implement BI systems for better service delivery and competitiveness in their respective industries.

Other contributions of this study include helping organizations build successful BI solutions that enhance the capability to improve their products and services (Indriasari et al., 2019), and the ability to understand their customers through the development of compelling customer profiles using machine learning capabilities (Rouhani et al., 2016). Although a substantial body of literature exists on BI, this study distinguishes itself by systematically categorizing 93 articles published between 2011 and 2021 to identify and classify 56 CSFs linked to organization empowerment and operations, 52 CSFs related to system implementation, and 28 CSFs associated with user enablement. The research adds value by providing a structured framework for understanding the multifaceted nature of BI system implementation, emphasizing the importance of organization empowerment, efficient system implementation, and effective user enablement. Furthermore, it addresses specific research gaps within each category and offers practical insights to guide organizations in successful BI system deployment.

We used the following structure in the paper to ensure a congruent flow and structure of the study. The first section introduces the research and the context. The next section is the background of the study that shows the grounds on which the study is based. This is followed by a section that presents the material and then a section in which the research methodology is discussed in detail. A fourth section presents the results of the study. In this section, we present the findings along with the characteristics of the included literature. The next section is the discussion in which the findings

are explained and discussed in detail. The final section concludes the paper with a summary of key findings and implications for research and practice.

BACKGROUND

Enterprises today are using BI systems to gather, process, and transform data into actionable insights to improve decision-making, service delivery, and overall performance. CSFs are essential components of the implementation of BI systems (Eder & Koch, 2018). The CSF theory states that several factors require consideration in the organization to ensure proper implementation of the various processes and changes intended by the organization (Ravasan & Savoji, 2019). Identifying CSFs is crucial in developing an implementation strategy for a BI system that aligns with the organization's environment, opportunities, and threats (Ranjbarfard & Hatami, 2020). Without determining the essential factors that will affect the success of a BI project, implementing a BI system will most likely lead to failure (Dobrev & Hart, 2014).

A weak project strategy can lead to poor analysis of the CSFs, inefficient use of project resources, poor definition of project scope, poor budget estimates, and increased risks (Adzmi & Hassan, 2018). For BI system implementation, success relies on precisely handling several critical areas. Organizations could select the following three categories: wage-empowered and efficient operations, system deployment, and user training. Each of them is a part of a unified, flawless system integration, made workable owing to their function to fulfill the crucial purposes in an organization.

Organizational empowerment through the use of BI systems is exemplified by connecting the technology with the organization's strategic objectives and operational methods (Yeoh & Popovič, 2016). This alignment is crucial in ensuring that the BI system acts as an aid or booster for the organization's objectives. The critical success factors of this category are leading your organization's culture to embrace change, providing strong leadership that owns BI initiatives, and ensuring effective communication channels among the different levels of the organization (Rezaie et al., 2018). These elements are fundamental components of setting up a system that not only takes on BI tools but also uses things they facilitate as the basis of better operational effectiveness and decision-making.

The technical deployment of BI systems, called system implementation, is a detailed, well-thought-out undertaking with a set course of implementation process. This category aims to facilitate intelligent decisions about selecting technologies, ensure that BI systems are integrated with the existing IT infrastructures, and manage data quality and security (Eder & Koch, 2018). However, organizations should avoid ignoring the importance of scalability and the adaptability of BI systems to future demands. The project management systems, within the boundaries of defining the scope of the project, managing the timeline, and allocating the needed resources, significantly contribute to this stage, guaranteeing that the implementation process does not deviate from the set target and does not exceed the determined boundaries (Yeoh & Koronios, 2010).

The BI system might be useless, even if it is good, if the users are not provided with an adequate level of enablement to fully gain the power of the technology. Such enablement based on the users' needs provides ongoing support services and creates a culture with feedback, both of which are the remedial features of the BI tools (García & Pinzón, 2017). User empowerment means providing an atmosphere where workers embrace systems and procedures of the BI process that are part of their everyday activities. In addition, it will set in motion initiatives geared toward customer satisfaction and possibly for the acceptance of BI among workers in the company (Serumaga-Zake, 2017).

These three categories play a fundamental role in the proper planning and implementation of an effective BI system implementation process. Through the analysis of these areas, companies can maximize the effectiveness of their BI investments not only on the technology level but also on an intense level of organizational culture formation where their decision-makers rely more and more on data-driven analysis results.

MATERIALS AND METHODS

The literature review was carried out using SLR methodology developed by Kitchenham & Charters (2007) and (Liberati et al., 2009). The approach ensures an unbiased and highly rigorous research process, outlining a structure for evidence synthesis and offers a pathway to identify, analyze, and, finally, classify the CSFs from relevant literature.

Data Collection

We obtained the articles from the ACM Digital Library, Web of Science, and ABI/INFORM databases between 2011 and 2021, providing wide coverage of information systems BI-related research. We formulated the search queries to capture articles at the intersection between the two sets of keywords. This research followed Kitchenham and Charters' (2007) recommendations for search strategy implementation to start the literature selection process. This process required doing extensive searches for articles using preestablished keyword lists. To capture articles at the intersection of business intelligence and system implementation, we used two distinct sets of keywords. The first set, focusing on business intelligence, included terms such as "business intelligence" and "BI." This choice reflected the breadth of the field and ensured that articles discussing various aspects of business intelligence were encompassed. These terms served as anchors, aligning the search with the core theme of the study. The second set of keywords centered on system implementation and adoption. The inclusion of terms such as "critical success factors," "success," "adoption," "implementation," "assessment," and "measurement" defined a scope that covers literature specifically related to the critical success factors associated with implementing and adopting systems. The query captured the intersection of the two sets of keywords in the titles and abstracts. Duplicates were eliminated to preserve data integrity and avoid repetition in the body of literature.

We further refined the resultant set by applying a set of inclusion and exclusion criteria. This step ensured a strong selection of pertinent literature for the study by offering a methodical and exacting procedure for gathering, reducing duplication, and reviewing articles. The inclusion criteria captured primary research that specifically addressed success variables that exist at the nexus of business intelligence and system implementation. We considered only publications in the English language. Systematic literature reviews, industry publications, and primary research that did not address the topic were excluded. The criteria were first applied to the titles and abstract, and then to the full text. Lastly, we conducted an in-depth review of the full-text articles to extract and categorize relevant CSF.

Coding and Qualitative Analysis of the Literature

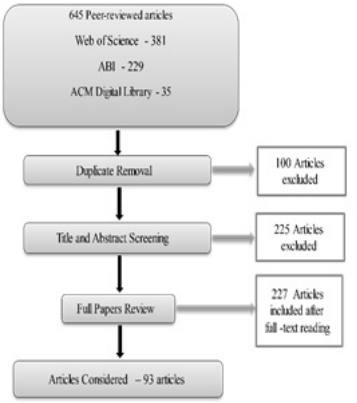
Extract and Streamline CSFs

The next step was to manually identify and streamline the CSFs from the collected articles using thematic coding. Thematic coding is a form of qualitative analysis that involves recording or identifying passages of text or images that are linked by a common theme or idea, allowing you to index the text into categories and therefore establish a "framework of thematic ideas about it" (Gibbs, 2007, p.38). Two reviewers reviewed the articles individually to calculate the inter-rater reliability score. We used kappa to calculate the agreement between the two reviewers. Cohen (1960) suggests two statistics, kappa and weighted kappa for measuring agreement between two raters on a nominal scale.

CSFs Descriptive Coding

We used a methodological approach based on descriptive coding, supported by inductive coding principles, to understand the complex landscape of CSFs in the implementation and delivery of BI systems (Chandra & Shang, 2019). A method for giving textual data meaning is descriptive coding, which is a crucial component of qualitative research (Chandra & Shang, 2019). It made it easier to thoroughly examine the CSFs in the context of this investigation by giving them labels that perfectly captured their characteristics. Because of this process, the CSFs were changed from discrete data

Figure 1. PRISMA Chart



points to cohesive, categorically ordered pieces, making them better suited for systematic analysis. Inductive coding was a helpful additional technique in this procedure (Chandra & Shang, 2019. Instead of imposing preconceived conceptions or established structures, inductive coding adheres to the principles of grounded theory by enabling categories and subcategories to arise from the data. By encouraging a comprehensive grasp of the material, this method enables patterns and linkages to emerge naturally.

The structure of this study's findings comprised the resulting categories, subcategories, and their interrelationships (Chandra & Shang, 2019. They recognized them as essential elements of the organizational landscape and captured the essence of the CSFs governing the implementation and delivery of BI systems. The study improved the CSFs' usability and application by categorizing them, providing a formal framework for researchers and practitioners looking to negotiate the challenging landscape of BI system installation (Chandra & Shang, 2019. Furthermore, categorizing these categories, with subcategories nested beneath more general titles, is hierarchical, mirroring the deployment of BI systems as a whole (Chandra & Shang, 2019.

RESULTS

The systematic literature review initially collected 645 papers. We used the Kitchenham protocol to remove duplicated articles, title, and abstract review, and then full-text review. The final number of the accepted papers is 93. Figure 1 diagrams the screening process, showing the number of papers included and excluded at each stage. Of the 93 accepted papers, we identified and recorded 879 CSFs from the accepted articles. Through the thematic coding processes described in the Coding and Qualitative Analysis of the Literature section, we streamlined these into 142 distinct CSFs. We carried out the coding in stages, first reading carefully and identifying CSFs and then merging overlaps to end up with a concise, meaningful list of CSFs using thematic coding as explained in the Coding and Qualitative Analysis of the Literature section. Using an inductive coding approach enabled us to allow subcategories and categories to emerge naturally from the collected data rather than being predefined. This process involved continuously grouping the study findings according to similar features and emerging themes. Through this bottom-up approach, the CSFs were organized into a hierarchical structure of subcategories and overarching categories that best represented the patterns and relationships observed in the data. Consequently, three primary categories were evident: Organization Empowerment & Operations, System Implementation, and User Enablement, each with its own subcategories.

Figure 2. Count of Subcategories by Category

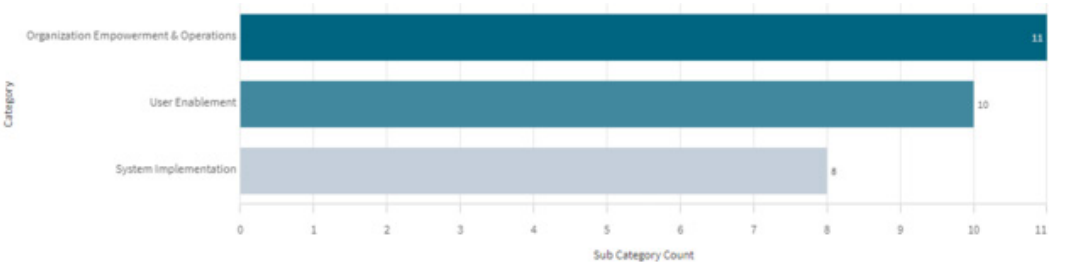


Figure 2 illustrates the number of subcategories within those major topics. The graph shows that Organization Empowerment & Operations had the most subcategories (11), followed by User Enablement (10), and System Implementation (8), indicating the breadth and complexity of factors involved in these areas.

Table 1 represents subcategories of CSFs under the Organization Empowerment & Operations category and gives an outline for each of them. As shown in the table, this category encompassed many factors, with subcategories such as Goals and Objectives, Organizational Structure, and Quality and Reliability emerging as critical focus areas. The large CSF count in this category tells us the importance of organizational matters and the issues a BI delivery team should consider for success.

Table 2 provides a similar breakdown for the System Implementation category. The central part of the CSFs in this group deals with the technical implementation aspects of a BI system, and the Systems and Technology Requirements, the Project and Change Management, Data Access, Management, and Quality were the subcategories that frequently occurred. The distribution of CSFs across these subcategories highlights the multifaceted nature of system implementation and the need to address various technical considerations.

Table 3 shows the User Enablement category, which is the lowest in CSFs compared with the other two categories. Nonetheless, the CSFs in this category—organized into subcategories such as User Feedback, User Participation, User Training, Information Quality, and Accuracy—emphasize the importance of user-centric factors in BI success.

Figure 3 presents the count of streamlined CSFs by category, offering a quantitative perspective on the distribution of CSFs. The bar graph shows the immediate high number of CSFs relating to Organization Empowerment & Operations, as well as System Implementation and User Enablement. Figure 4 displays the frequency of the top 15 CSFs identified in the literature. This graph furnishes the information that contains the most often mentioned CSFs, having been cited throughout different studies, implying the importance and popularity of these CSFs in sustainability implementation studies.

The class distribution according to distinct varieties and groups is displayed in Figure 5. The figure provides a comprehensive overview of how the CSFs are spread across the different dimensions of BI implementation. Creating a mosaic plot of organizational factors, system implementation, and user enablement reveals leading and essential roles.

Table 4 presents the count of collected CSFs by category, offering a quantitative perspective on the distribution of extracted CSFs from the accepted literature articles. Lastly, Figure 6 shows the top 15 streamlined CSFs by subcategory, indicating a concentration in the studies on system quality, reliability, efficient operation, user feedback, and system and technology requirements.

DISCUSSION

The classification of the CSFs stems from two vital needs in BI systems. First, the categorization is driven by the inherent need to guarantee the success of BI system implementation and delivery.

Figure 3. Count of Streamlined CSF by Category

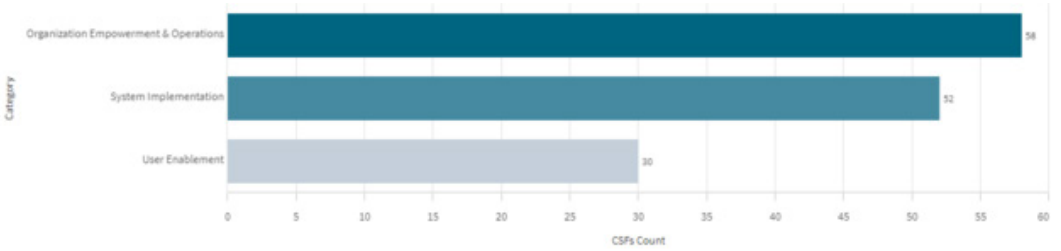
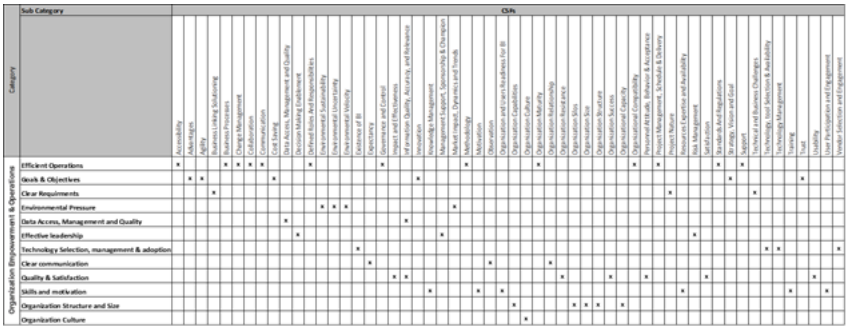


Table 1. Breakdown of Organizations Empowerment & Operations CSFs and Their Categorization



This process entails an in-depth exploration of a myriad of factors contributing to effective execution, ranging from technological infrastructure to organizational culture and leadership

Figure 4. Frequency of Top 15 Collected CSFs in Existing Literature

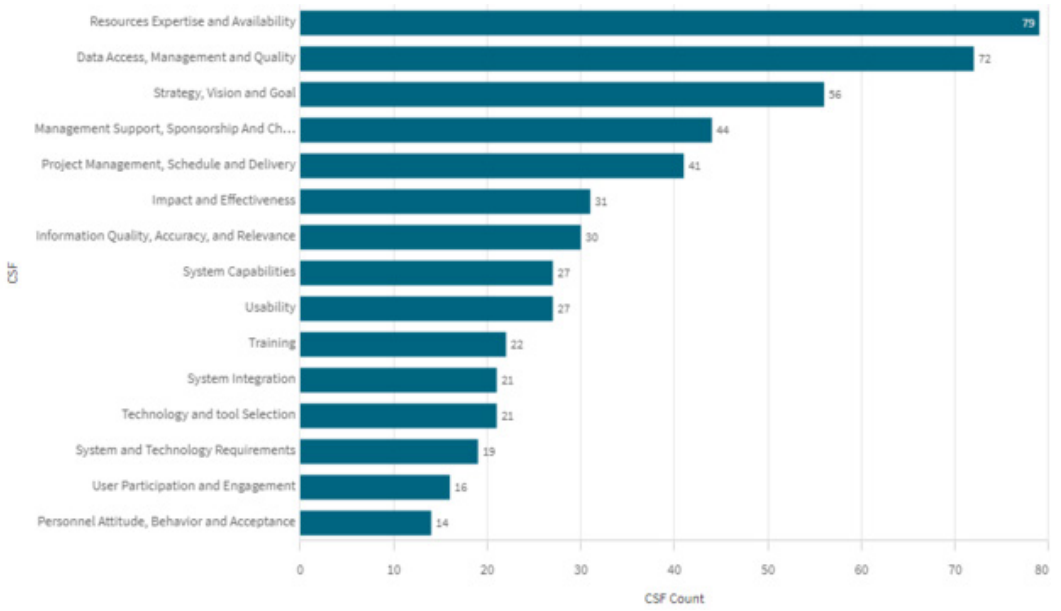


Table 2. Breakdown of System Implementation CSFs and Their Categorization

Category	Sub Category	Accessibility	Agility	Architecture & Structure	Budget and Cost	Change Management	Collaboration	Communication	Continuous Improvement	Defined Roles And Responsibilities	Deployability	Existence of BI	Expectancy	Functionality	Governance and Control	Impact and Effectiveness	Innovation	Measurement and Testing	Methodology	Performance Quality	Pilot System Enablement	Project Management, Schedule & Delivery	Project Risks	Purge And Archive Planning	Resources Expertise and Availability	Security	Standards And Regulations	Strategy, Vision and Goal	Support	Sustainability	System and Technology Requirements	System Capabilities	System Capacity	System Centralization	System Compatibility	System Complexity	System Customization	System Flexibility	System Implementation	System Integration	System Quality	System Reliability	System Responsiveness	System Security	System Simplicity	System Success	Technical and Business Challenges	Technology, tool selection & Availability	Technology Management	Technology Maturity	Vendor	Vendor Selection and Engagement
System Implementation	Quality & Reliability	x	x						x	x		x			x			x	x																																	
	System and Technology Requirements			x												x				x		x			x	x					x																					
	Cost				x																							x																								
	Project & Change Management					x									x							x																														
	Adequate resources						x			x																x			x																						
	Data Access, Management and Quality																										x																								
	Security																																																			
	Technology Selection, management & adoption												x				x																																	x	x		x

Table 3. Breakdown of User Enablement CSFs and Their Categorization

Category	Sub Categorization	Adoption	Advantages	Business Linking Solutioning	Business Processes	Collaboration	Communication	Competitive, Social and Environmental Pressure	Continuous Improvement	Data Access, Management and Quality	Decision Making Enablement	Domain Analytics Knowledge	Expectancy	Impact and Effectiveness	Information Quality, Accuracy, and Relevance	Innovation	Knowledge Management	Market Impact, Dynamics and Trends	Observation	Personnel Attitude, Behavior & Acceptance	Satisfaction	Training	Trust	Usability	User Motivation and Empowerment	User Participation and Engagement	User Preference	User Quality	Users Traits
User Enablement	User feedback	x												x					x	x	x		x	x	x	x	x	x	x
	Business Linking Solutioning		x	x	x																								
	Clear and concise communication					x	x																						
	Market Impact, Dynamics and Trends							x										x											
	Continuous improvement								x		x		x				x												
	User-focused training											x					x					x							
	Information Quality, Accuracy, and Relevance									x					x														

commitment. Through a comprehensive SLR, these factors are not only identified but also refined and streamlined, resulting in a set of CSFs tailored to the intricacies of BI solution deployment. Second, the categorization sought to unravel the complex interplay of various CSFs in shaping the BI implementation process and system delivery. This phase demanded a nuanced understanding of the intricate relationships and dependencies among identified CSFs, recognizing that the success of BI implementation hinges on the dynamic interplay of multiple factors. The resultant streamlined CSFs signified a synthesis of insights from diverse sources, presenting a consolidated and refined set of factors that wield significant influence over BI success.

Table 4. Count of Collected CSFs by Category

Category	CSFs Count
Totals	873
Organization Empowerment & Operations	676
System Implementation	534
User Enablement	273

Figure 5. Distribution of Streamlined CSFs by Categories and Subcategories

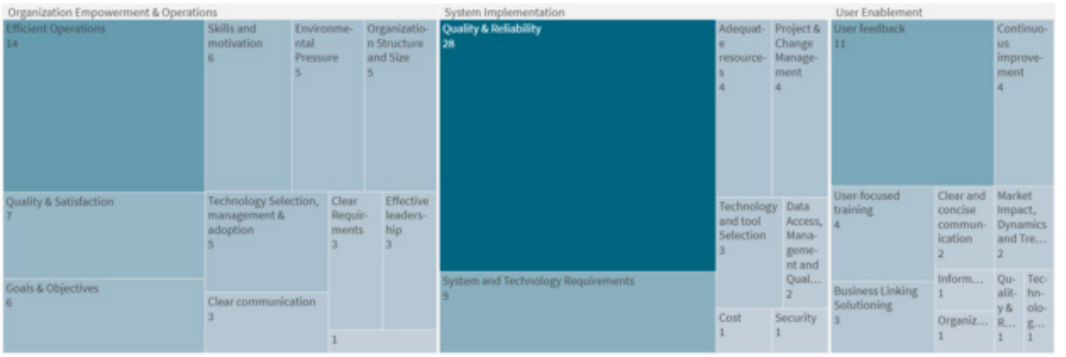
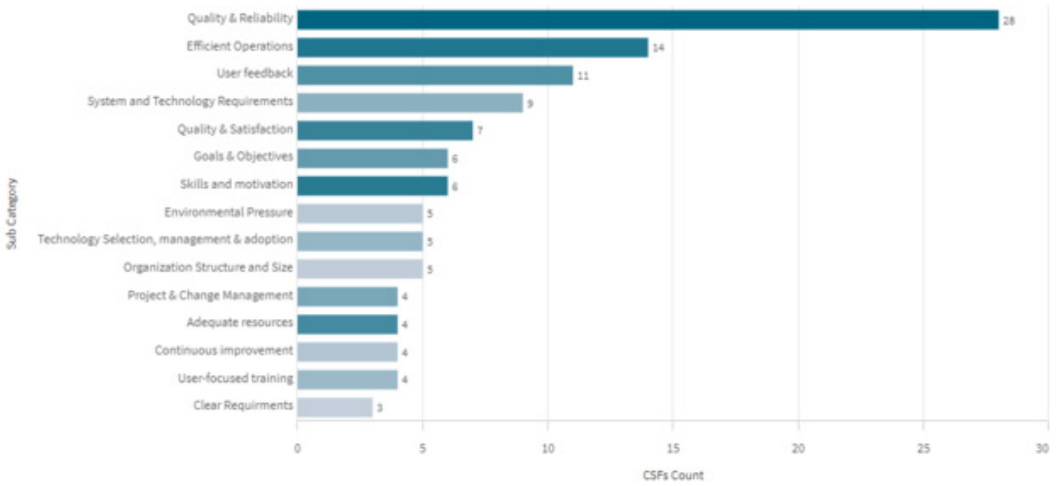


Figure 6. Count of Top 15 Streamlined CSFs by Subcategory



Organization Empowerment and Operations

Organization Empowerment & Operations is an important category for the successful deployment of BI systems. This category encompassed CSFs related to strategic alignment, organizational structure, resource allocation, and change management. This highlights the importance of factors in this category, which comprises 56 identified CSFs. Within this category, several subcategories stood out as key areas of focus. The category of Goals and Objectives demonstrated that for BI projects to succeed, they should be designed to align with the institution's primary mission and strategy (Eybers & Giannakopoulos, 2015; Yeoh & Popovič, 2016). Critical CSFs in this area included clearly defined business objectives, a well-established business case, and a strong link between BI strategy and overall organizational strategy. Through BI initiatives aligned with the organization's strategic imperatives, companies are enabled to appropriate the relevant BI value and impact of the resulting BI investments.

Another significant subcategory was Organizational Structure, which highlighted the need for an enabling organizational environment that supports BI adoption (Rezaie et al., 2018). CSF structures, including cross-functional teamwork, appropriate communication channels, and a performance-driven decision-making culture, were found to be fundamental. The Quality and Reliability subcategory of the study focusing on data quality in BI initiatives is an excellent example of the emphasis on data

integrity in BI initiatives (Mudzana & Maharaj, 2015). CSFs such as data accuracy, consistency, and timeliness were deemed essential for ensuring the reliability and trustworthiness of BI insights. Companies should determine processes for efficient data administration and the controls for data accuracy to fit big data into their BI systems.

Other notable subcategories within Organization Empowerment & Operations included Management Commitment and Support, Training and Education, and Change Management. These strands of BI factors emphasize that the chances for BI implementation success are raised with proper leadership acceptance, employee skill contributions, and sound change management practices (Eybers & Giannakopoulos, 2015; Yeoh & Popovič, 2016).

Efficient operations are crucial to the improvement of business processes through problem identification and solutions. Management commitment and support are critical factors in BI system implementation. Consistent support from an organization's leadership makes it easier for the BI implementation team to secure or acquire the necessary operating resources for the implementation, including human skills, finances, and other requirements (Yeoh & Popovič, 2016). Organizations must not implement BI systems without determining the strategic business, information requirements, and other related factors (Chen et al., 2000). Chen et al. (2000) identified data access, management, and quality as a critical category. According to Marshall and de la Harpe (2009), several key performance measures are directly impacted by the quality of data on decision-making. The time spent on investigating and resolving data quality issues has a major impact on productivity. According to Martins (2020), the development of effective leadership is crucial to the development of effective strategies. Particularly, leadership provides the strategic business vision that drives the implementation. Business leaders identify the strategic benefits, resources, costs, timeline, and risks involved in implementation.

On the other hand, Ingram and Lord (2019) identify organizational structure as a category that improves operational efficiency by providing clarity in different levels of a company. According to Venkatesh and Peñaloza (2006), organization structure is important for an institution because it allows for the identification and satisfaction of specific organizational needs, ultimately creating efficiency. Organization readiness and management strategies are crucial in ensuring that the BI systems are successfully implemented and delivered (Anjariny & Zeki, 2014). Ensuring that there is management goodwill is therefore critical in successfully implementing a BI system (Chen et al., 2016). The organization ensures all the essential aspects are considered and taken care of through the implementation process. Management facilitates resource allocation, recruitment of high-skilled project team members, and user participation. All these CSFs increase the chances for BI implementation to happen within a set timeframe and budget, thereby achieving the intended functionality (Jamaludin & Mansor, 2011).

The research of Richards et al. (2019), which emphasizes the significance of BI efficacy, is consistent with our findings; their empirical research indicates a significant relationship between corporate performance management and BI efficacy. This discovery is consistent with the CSFs we identified for System Implementation, User Enablement, and Organization Empowerment & Operations. A crucial part of improving corporate performance management is effective BI implementation that is governed by these CSFs. The importance of data, which serves as the basis for both BI and competitive intelligence operations, is highlighted by the discovery of CSFs relating to data access, management, and quality. As a result, the findings hint at the contribution of big data analytics to the development of competitive intelligence skills within a company.

System Implementation

CSFs in this category covered different systems implementation tasks in a technical line, including technology selection, system architecture, data integration, and project management. With 52 identified CSFs, this category highlighted the multifaceted nature of BI system implementation and the need for a comprehensive approach. The category of System and Technology needs to concentrate on the process of BI tool and technology selection, which should work well and align with the organization's

decisions (Rezaie et al., 2018). CSFs such as scalability, flexibility, compatibility with existing systems, and user-friendliness were critical considerations. Companies should deliberate on the potential options they have in technology and pick BI solutions that facilitate business needs and user satisfaction.

Project and Change Management emerged as another critical subcategory, stressing the need for effective project management practices and change management strategies (Yeoh & Popovič, 2016). Clear defining of the CSFs, such as projected scope, realistic timelines, resource allocation, and stakeholder engagement, among other factors, were considered key for a successful BI implementation. Effective project management ensures that BI initiatives are delivered on time, within budget, and to the required quality standards. Data Security, Data Management, and Data Quality were the subcategories that emphasized the significance of excellent and well-managed data for the competence of BI systems (Olszak, 2016). CSFs such as data integration, data warehousing, and master data management were identified as crucial elements. Institutions that wish to have BI systems should find a way to maintain flawless governance frameworks for data and data quality just for trustworthy and reliable data. Other subcategories within System Implementation included System Development, System Capability, and Service Quality.

System implementation involves processes such as the acquisition of necessary technical infrastructure and expertise, adopting an implementation framework, and security, and deciding on the usability and budget (Harison, 2012). Understanding the CSFs in the technology selection, management, and adoption is essential in ensuring the quality and reliability of the delivered BI system. According to Ngai et al. (2008), material planning is crucial to the functionality of an institution. Project & Change Management is defined as a category under System Implementation, and Prosci.com (2020) describes the idea as the bottom line for successful understanding of the expectations on what is expected to happen to enact the change required. In this regard, project management focuses on the successful design, development, and delivery of the project by focusing and enabling those affected by change, thus enabling them to adapt, engage, and utilize the change (Smith, 2021). Most importantly, the BI system implementation needs to be driven by business needs and be organizationally focused. There should be interactive involvement of the business end and adaptability to meet the evolving business needs and requirements in the entire lifecycle of the BI system (Yeoh & Popovič, 2016). Aurum & Wohlin (2003) find that the existence of adequate resources is crucial to providing solutions that integrate processes across different avenues of the organization by allowing the users to interact within a given interphase. Consistent support from the senior executives is crucial in obtaining the necessary operating tools and fulfilling needs, such as funding and human capital requirements (Janyapoon et al., 2021). In addition to these requirements, the respective teams in the implementation need to provide continued high-level support and maintenance to the BI tools applications and to the wider system scalability and data modeling concerns. This step is especially important while facing evolving business and constantly changing information requirements. It is important to note that funding for a BI system is costly and requires a significant amount allocated in the budget. Data access, management, and quality are also identified as a category under system implementation and have been discussed under organization empowerment and operation.

User Enablement

Although having the fewest identified CSFs (28), the User Enablement category played a vital role in the successful adoption and utilization of BI systems. The category implies user involvement, training, and support, part of the BI initiatives that could serve user-driven solutions. The User Feedback subcategory highlighted the need for active user engagement and continuous feedback throughout the BI implementation (Serumaga-Zake, 2017). CSFs that the company will adopt, such as engaging users in active communication, designing feedback mechanisms, and setting up user satisfaction surveys, are the main points that fulfill users' needs and match them with the BI systems.

User Participation was another significant subcategory, stressing the importance of involving users in designing, developing, and testing BI systems (Yusof et al., 2013). The Information Quality,

Accuracy, and Relevance subcategory emphasizes delivering accurate, timely, and relevant information to users through BI systems (Janssen & Singh, 2022). In particular, processes encompassing data quality review, timing of data updates, and applicable information to users' requirements were pinpointed as significant factors. Organizations can empower users to make informed decisions and drive business value by providing high-quality and actionable information. Under the User Enablement category, User Training, User Support, and User Acceptance were the subjects of focus as well. These subcategories underscored the critical role of comprehensive user training programs, ongoing technical support, and user adoption strategies in ensuring the effective utilization of BI systems (García & Pinzón, 2017).

Janyapoon et al. (2021) stressed that successful implementation should accommodate ongoing user support during the project transition. Organizations must have a plan on transferring the BI to the end user and on blending the implemented system with routine business prior to project initiation. Ensuring that the BI solution meets the users' needs is essential to increase their satisfaction and acceptance. A clear, concise communication needs to be adopted, users should be actively involved and trained throughout the implementation process, and businesses should communicate the change in time (Propeti & Giuliani, 2017). As a change process, BI implementation requires better user participation for better user communication of the users' needs for a successful implementation. This process will lead to positive net benefits and continuous improvement that will directly impact the performance of an organization (Serumaga-Zake, 2017). User enablement leads to better efficacy. With their feedback being highly valued, users can also contribute significantly to the growth and improvement of the various services, including BI systems.

Information quality, accuracy, and relevance are crucial to the development of user-friendly platforms for users to manage their data (Janssen & Singh, 2022). The purpose of information management in this case is to help people and organizations maintain an interconnectedness that optimizes the use of data, thus easing the concept of decision-making for the benefit of the organization (Alam et al., 2023).

Inter-Relationship Among CSFs

For practitioners looking to successfully integrate BI systems, comprehending how the various CSFs interact with one another is crucial. Even if we had divided these components into separate categories, recognizing how they interact and what it means in real life is crucial. Leadership, organizational design, and readiness are interconnected factors. A thorough organizational structure can be developed with the help of effective leadership, supporting preparation for BI adoption in turn. Additionally, there are connections among the requirements for technology, project management, and resource availability. Successful project management and technology alignment with organizational needs both depend on having enough resources. User engagement, feedback, and communication are all interrelated. Enhancing user satisfaction and enablement can be achieved by involving users in the implementation process through efficient communication and feedback channels. Organizations can adopt BI systems in a holistic way by recognizing these interrelationships.

CONCLUSION

Through a SLR, we identified and categorized CSFs associated with the implementation and delivery of BI systems. Using the SLR, we streamlined and categorized 879 CSFs into 56 CSFs linked to Organization Empowerment & Operations, 52 CSFs related to System Implementation, and 28 CSFs associated with User Enablement. Most research focused on Organization Empowerment & Operations. User Enablement received the least attention compare to the other two categories which reflects that less articles paid attention on user enablement.

This study contributes to the existing knowledge on BI system implementation and delivery by providing a comprehensive, structured approach to identifying the CSFs as well as insights for

future research. The identified CSFs can serve as a valuable guide for organizations to evaluate their readiness for BI system implementation and delivery. Policymakers and consultants can also leverage the findings of this review to develop strategies and frameworks to support BI system implementation and delivery. In addition to making scholarly contributions, this research provides useful advice for businesses looking to successfully design and deliver BI systems. The study provides decision-makers with insights that can guide their strategic planning by highlighting the significance of organization empowerment, effective system deployment, and effective user enablement (Antoniadis et al., 2015; Janyapoon et al., 2021). Moreover, this study expands the field of literature by presenting methodologically sound guidance supported by evidence-based best practices extracted from the conducted systemic analysis of BI CSFs, deepening the scope for further research and engaging in practical implementation of BI projects. Furthermore, it underscores the interconnected nature of the CSFs and suggests opportunities for further exploration into the correlation among BI CSFs. This study adds to the existing literature on the determinants of successful BI implementation and serves as a source of practical insights for organizations implementing BI programs.

The study's structured framework is a useful resource for overcoming the difficulties of BI deployment. The likelihood of a successful BI system deployment might be increased because it offers a concise, well-organized method for resolving the numerous CSFs involved (Dobrev & Hart, 2014; Harison, 2012). Although much of the existing literature tends to focus on other aspects of BI implementation, this study brings attention to the often-neglected domain of user enablement. By highlighting 28 CSFs in this category, it recognizes the significance of user satisfaction and engagement in BI system success, offering a more comprehensive perspective (Serumaga-Zake, 2017; Yusof et al., 2013). Despite the contribution of this review, some limitations need to be acknowledged, including the reliance on peer-reviewed articles, and the potential for bias in the selection of articles owing to the exclusion of non-English language publications. Additionally, the review did not include grey literature and reports, which may have added valuable insights to the study. Overall, this systematic literature review provides a valuable contribution to the understanding of the CSFs of BI system implementation and delivery and can serve as a foundation for future research and practical applications.

Recommendations for Future Research

Although in this systematic literature study, we successfully categorized and identified the CSFs for BI system adoption and delivery, it is important to recognize certain research gaps within each category.

Organization Empowerment and Operations

Research on the impact of certain CSFs, such as sustainability and organizational structure, on the implementation of BI systems is scarce in this category. Future studies should delve more into these elements to comprehend their precise effects.

System Implementation

Although our analysis classifies CSFs associated with system implementation in great detail, additional research is required to examine how these factors interact. There is also a need for a deeper examination of how technology requirements and resources availability affect the development of BI systems.

User Enablement

User enablement was found to have a smaller number of identified CSFs. The effective completion of BI projects should be prioritized in future research, and this research should focus on examining the effect of user interaction and feedback. Furthermore, considering how user enablement aspects affect user performance can be insightful.

CONFLICTS OF INTEREST

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