

Presented to the Interdisciplinary Studies Program:



UNIVERSITY OF OREGON
APPLIED INFORMATION MANAGEMENT

Applied Information Management
and the Graduate School of the
University of Oregon
in partial fulfillment of the
requirement for the degree of
Master of Science

Best Practices for Local Government Business Intelligence Implementations

CAPSTONE REPORT

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May 2016

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Abstract

The report develops best practices to guide local governments in implementing business intelligence (BI) systems. Fifteen academic sources were reviewed and categorized as: challenges in BI implementations, best practices in BI implementations, and lessons learned from local government IT projects. The sources examine BI from the private and public sector. There are limited sources specific to local government; therefore, best practices were developed from all sources. The best practices are intended for local government leaders, managers, and project leads implementing BI.

Keywords: business intelligence best practices, local government business intelligence; public sector business intelligence.

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Introduction to the Annotated Bibliography

Problem

Business intelligence (BI) systems are in use in all types of industries and organizations as a means of capitalizing on the inherent value of an organization's mass data collection; the technology quickly analyzes the data into reliable information that is then used for improved decision making (Isik, Jones, & Sidorova, 2011). Papadopoulou and Panagiotis (2010) further describe the BI system as one that works in conjunction with an organization's existing IT systems to bridge the gap between existing capabilities and the increasing demand by strategic managers for dynamic and timely information. Thus, a BI system is an extension of current IT systems and is introduced when management determines that the information delivery capabilities of the existing systems are incapable of delivering strategic information. The inability of existing systems to fulfill this demand is generally attributed to inflexible reporting within the legacy systems and/or scattered information silos through the organization (Papadopoulou & Panagiotis, 2010).

Once introduced, there are many operational and strategic uses that a BI system provides to an organization. Wang (2014) describes four strategic uses as: (1) manage operating performance; (2) enhance customer relationships, monitor activities of the business and support decision making; (3) apply BI to specific business processes or organizational strategies; and (4) provide management with reports that answer questions such as 'How will a five percent increase in production of product B in the summer change profit forecasts?' or 'During different seasons what area of the country does our most profitable customer reside?'. Additionally, a BI system provides management additional insight into the following areas: (a) understanding the full capabilities of the enterprise, (b) recognizing operational trends, (c) developing forecast

models to evaluate future opportunities in the operating market, and (d) analyzing actions taken by competitors (Wang, 2014).

While there is high potential to benefit from a BI system, all organizations, public and private, face common implementation challenges. Key challenges with BI implementation projects include resistance to change by staff, failure to adopt the BI system, inaccessible silos of data throughout the organization, and failure to provide adequate and ongoing support (Harison, 2012). Aside from these technological factors, Savodelli et al. (2014) state that BI implementations are more than mere technology-focused implementation projects, and note the necessity for considerable emphasis on factors inside and outside the technological realm. These factors include confirming the need for a BI system by determining if the organization's current IT systems already meet the desired goals that the BI system is expected to deliver and whether the organization supports and welcomes IT innovations such as the introduction of a new BI system.

Local governments face a variety of challenges while embarking on BI initiatives. Yeoh, Koronios, and Gao (2008) find that for BI implementations in local government, managers must exude strong leadership and champion support, adequately administer change management process, and above all directly connect BI function to fulfill specific business needs. Savodelli, Codagnone, and Misuraca (2014) further summarize these points into three high-level barriers for public managers to consider which include: (a) technological and economic factors such as lack of bandwidth, interoperability issues, and high operating and maintenance costs; (b) managerial and organizational factors such as resistance to change, lack of adequate project management skills by managers, and lack of skills by staff; and (c) institutional and political

factors such as lack of political support, changing public policy cycle, lack of trust and transparency, and security and privacy concerns.

Business intelligence implementations are challenging projects that offer the potential for multiple organizational benefits, but also a real risk of failure (Harison, 2012). Isik et al. (2011) reveal that missteps in implementation cause some BI systems to not achieve the goal to improve decision-making. Given the amount of risk as well as reward posed by BI implementations, best practices for BI projects can prevent costly errors and help to ensure successful outcomes (Papadopouloosa & Panagiotis, 2010).

Purpose Statement

The purpose of this annotated bibliography is to present literature that provides best practices for BI implementations at the local government level, gleaned from BI implementations in both the public and private sectors. At present, there are few materials to directly address BI implementations at the local government level; however, an abundance of academic sources address implementation in the private sector. This study considers resources across both spectrums to establish best practices for local government BI implementations. Harison (2012) provides the term “critical success factors” to describe crucial elements that will have substantial impact towards the success of a BI implementation and future performance of the organization. The best practices from this study will serve as a guide for local government BI project leaders in fulfilling the role to oversee all technological, organizational, and environmental aspects of business intelligence implementations.

Research Question

What are best practices from successful BI implementation projects in the private and public sectors that can be applied to local government BI implementation projects?

Audience

This study is useful for local government leaders, managers, and IT professionals exploring the possibility of, or already implementing, a BI system. The government leader is defined as a member of the executive or legislative branch responsible for overseeing the overall government operation and/or allocating government resources (e.g., defining the strategic plan or project budget). Local government managers include any department head or mid-level manager tasked with overseeing or researching a BI project. Lastly, IT professionals include all staff within the IT department, including project managers and IT technicians charged with planning or coordinating a BI implementation.

The objective of this research is to provide the aforementioned groups with a list of best practices to achieve successful implementations of BI systems in the local government environment. This research study considers examples gleaned from previous studies published in academic sources that cover: (a) successful BI implementation projects, (b) lessons learned from unsuccessful BI endeavors, and (c) specific application in local government or private industry – whichever is determined to define a critical success factor that will be applicable for local governments. In addition, other sources that provide descriptions of challenges posed by BI projects are included.

Search Report

Search strategy. The general search strategy in this study involves the University of Oregon's online Library databases. Actual searching is completed by entering key statements such as *implementing business intelligence*, *business intelligence local government*, and *local government information technology projects*. The search results are filtered to show only resources from peer-reviewed journals. The title of each resource is scanned to determine the

applicability to this study. Resources that appear to apply to this study are opened and the abstracts are analyzed to make a final determination of applicability to this study. Those that show promise are saved for in-depth review and analysis, while others are discarded.

The process is iterative, as additional search phrases and terms are found by reading abstracts and other content. Critical evaluation of sources to eliminate those that are irrelevant is a key factor in selecting the best set of resources. Preference is given to academic databases, which reveal additional search criteria, key terms, or research avenues; the use of Google and non-scholarly search engines is avoided.

Finding academic sources directly related to BI implementation at the local government level is a challenge, as the majority of articles returned from searches relate to BI implementation in corporate environments. The solution is to locate academic resources related to local government implementations and combine findings with the abundance of resources on BI implementations at the private level. The research combines elements from both government and private sectors to establish best practices.

Key terms. The following search terms are used to return sources tied to the study topics:

- Business Intelligence Background
 - Business Intelligence
 - Implementing business intelligence systems
 - Yields additional terms: egovernment, government services
 - Yields academic journals: Journal of the Association for Information Science and Technology
 - Successful business intelligence implementation
 - Failed business intelligence implementation projects

- Best Practice in Business Intelligence Implementation
 - Business intelligence success factors
 - Business intelligence Critical Success Factors
 - Business intelligence + implementation
- Lessons Learned from local government IT projects
 - Information technology project local government
 - Why local government information technology projects fail
 - Government business intelligence
 - Automating government
 - Business Intelligence Local Government
 - GASB Business Intelligence
 - The Government Accounting Standards Board (GASB) is used as a resource to locate specific sources related to local governments
 - Local Government Studies – from UO Library
 - Local Government Technology
 - Public Sector + Business Intelligence

Documentation approach. Resources are currently documented using Microsoft Word's Manage Source program, a proven and preferred strategy favored by the researcher. The Manage Source program collects the author(s) name, article title, journal name, year of publication, page numbers, and digital object identifier (DOI). Portable document format (PDF) copies of each resource that contributes to this study are saved for analysis in a computer file under the categories: (a) local government connection; (b) general BI; and (c) best practices in BI projects.

Additionally, a Microsoft Excel worksheet is used to track, sort, and categorize searches. The worksheet captures the publication year, author (s), database, date located, key words, DOI, research category (i.e., local government connection, general BI, and best practices for BI implementation), and yes/no category to indicate if the source was used. Accepted sources are entered in the official Microsoft Word Manage Source program.

Information evaluation criteria. Resource evaluation is in accordance with the publication *Evaluating Information Sources* published by the University of Florida's Center for Public Issues Education (2014). Sources are evaluated considering the following criteria: (a) authority, (b) timeliness, (c) quality, (d) relevancy, and (e) bias.

Authority. Authority of the author is first screened during initial key word search by filtering the results to display only peer reviewed journal sources. Authority is further determined by reviewing the author's biographical data as provided in the resource and looking for association with reputable professional organizations or academic institutions.

Timeliness. Timeliness is limited to articles within the last ten years – sources outside this timeframe are not considered regardless of their title. The limit was determined as appropriate by the researcher to encompass timely and relevant material, considering that technological changes and approaches in BI implementation strategy and products have improved from earlier iterations.

Quality. The quality of a source is determined by evaluating the accuracy of spelling, punctuation, and grammar. Additionally, the structure, layout, and overall presentation of information within the report are also factored into the determination of quality work.

Relevancy. Sources within the ten-year timeframe are evaluated for relevancy in contributing direct information that addresses the research goal – establishing best practices for

business intelligence implementation for local governments – and to provide information in helping to answer the research questions.

Bias. Careful attention is made to detect potential bias such as an author favoring a particular viewpoint by not addressing, considering, or mentioning opposing views, or through subtle or blatant marketing attempts of a particular product or business process. Additionally, only sources from peer reviewed journals are considered. The research avoids publications by BI vendors such as IBM and Microsoft.

Annotated bibliography

The following Annotated Bibliography presents 15 references that examine the implementation of business intelligence systems in the public and private sectors as documented in academic literature. The information gleaned from the resources will fulfill the research purpose to provide best practices to implement successful BI systems at the local government level. The references are presented in three categories: (a) challenges in business intelligence implementations, (b) best practices in business intelligence implementations, and (c) lessons learned from local government information technology projects.

Each annotation consists of three elements: (a) full bibliographic citation, (b) full abstract, and (c) a summary. The summary presents information gleaned from the specific source that contributes to the formation of this report. Contributions are described as (a) providing information on challenges in BI implementations, (b) providing lessons learned from a successful or unsuccessful BI implementation in the public sector, and/or (c) relating to local government IT implementations, either successful or unsuccessful, and factors unique to the government operation.

Challenges in Business Intelligence Implementations

Harison, E. (2012). Critical success factors of business intelligence systems implementations:

Evidence from the energy sector. *International Journal of Enterprise Information Systems*, 1-13. doi: 10.4018/jeis.2012040101

Abstract. Business Intelligence (BI) systems are applied by increasing numbers of organizations in a wide range of sectors. Despite the growing numbers of BI solutions and the experience augmented in many implementation projects worldwide, as well as the value that BI systems provide to organizations, IT literature lacks a coherent set of

definitions through which BI systems can be classified, categorized, and assessed.

Furthermore, BI implementation projects often do not succeed or do not fully accomplish the degrees of value and performance as expected, when firms fail to complete the system implementation, to satisfy the needs of users or when the benefits BI systems produce are lower than anticipated. This paper presents an analytical framework through which BI systems are defined and classified. On the basis of this framework, possible technical, organizational, and personal factors that affect the failure, partial or full success of BI system implementations are discussed. These factors are followed by a case study and empirical data analyses that exemplify and assess the extent to which various organizational attributes and properties of users influence the success or failure of BI implementation projects. Finally, implications regarding the management of BI system implementation projects and the organizations that apply them are derived.

Summary. This article presents a case study of a Dutch energy company that recently implemented a BI system. Published literature and an anonymous survey from staff within the company serve as the basis of the study. The purpose is to identify critical success factors to assess BI implementations as successful, partially successful, or failures. The author notes that despite the vast array of potential benefits of a BI system, many firms fail to realize the potential of the systems due to the complexities inherent within the programming and user interface.

Despite the risk of failure there remains a need for and drive to implement BI systems, as most managers recognize the value of information derived from the data and therefore regard BI systems as important resources. A BI system aids management and other information users within the firm by providing the ability to manage and access vast

data sources of varying forms that were not previously used on a regular basis due to access challenges. BI systems exist to satisfy the challenge through embedded capabilities including: (a) data warehousing; (b) data mining; (c) online analytical processing (OLAP); (d) decision making applications; and (e) knowledge management.

The author concludes that BI implementation success relates to organizational, technical, and operational factors including interfaces to legacy systems, access to data, computer literacy of employees and proper training. The author identifies the following points: (a) leadership and communication is essential to generate support for and use of the BI system and mitigate resistance to technical change; (b) the organizational culture must support the introduction and innovative use of new technologies. Organizations dominated by change-adverse cultures will face high levels of resistance and major difficulties during implementation, even despite the commitment of management; and (c) the human resource assets of the organization are critical for providing champions/change agents to lead the implementation, rally support, encourage system use by other staff, provide training on the new system, and establish fundamental support structures such as the help desk and system maintenance team.

The author also derived lessons learned including: (a) system quality – BI systems are loaded with features, but only small fractions are applicable to current business needs. Respondents trusted standalone tools provided by the employer such as Microsoft Excel and Access over the new BI system. The primary concern was not with the BI system user interface or processes, but rather with the magnitude of information the system generates. Users found it easier to use familiar tools with their existing data structures than to learn to use the new system; (b) service quality – there was friction related to IT

and end user relations. The IT department did not understand their clients and often prioritized their own system features ahead of actual user issues and requests. Users were reluctant to contact IT when having difficulties and often reverted back to standalone tools such as Microsoft Excel and Access. The author notes that as long as users continue this practice, the goals of BI success will not come to fruition and users will not learn the system; (c) use, intention to use, and user satisfaction – the key factor in ensuring use and user satisfaction is ongoing and observable IT support, which includes frequent interaction with and training of users. The complex nature of the BI system is the main reason for non or limited use; and (d) individual and organizational impact – respondents indicated that development of vast technical and operational knowledge are required but cannot be easily attained through offered courses and instruction. In closing, the author notes that anticipated benefits were not achieved by all users within an organization except for a few experts. The following factors contributed that outcome: (a) the BI system did not produce expected information because of lack of skill in operating the system; (b) the BI system was regarded as difficult to use and not user friendly; and (c) too many features were viewed as a disadvantage and deterrent to on-going use.

Wang, H.-C. (2014). Distinguishing the adoption of business intelligence systems from their implementation: the role of managers' personality profiles. *Behaviour & Information Technology*, 1082-192. doi: 10.1080/0144929X.2013.869260

Abstract. For decades, the marketing guidelines of enterprise software providers have focused on those managers who are likely to be more innovative in adopting new information systems. The current study argues that this approach demands improvements for two reasons: (1) this tactic may be biased, since past studies have only examined the

single trait of innovativeness and its impact on an individual adoption intention and (2) the organisational implementation intention might be more important than the individual adoption intention, but the former has been largely ignored in the existing literature.

Based on the case of business intelligence (BI) systems and data from 62 senior managers, this study is a pioneer in that it empirically reveals that managers' individual adoption intention is distinct from their organisational implementation intention. Further, while managers' innovativeness may be a significant determinant of their individual adoption intention towards BI systems, the issue of whether managers actually implement BI systems in their organisations is dominated by their involvement characteristics. Fruitful suggestions are proposed for practitioners and scholars.

Summary. This study examines the role of managers in the implementation of information systems including business intelligence systems. According to Wang, managers fulfill two roles in BI implementations: as a system user and potential project sponsor who also coordinates implementation. Additionally, managers also possess varying levels of innovation and involvement that affect their personal adoption of BI systems. Using the PIIT model (Personal Innovativeness in the domain of IT), Wang tests five hypotheses to determine if managers' innovative behavior and/or involvement in the implementation affect their adoption and use of new BI systems. The study was conducted with 62 mid to high level managers from the Taiwan banking, insurance, government, and IT industries. The findings in the study are useful to measure the behaviors of managers with respect to their interest in and adoption of BI systems. Findings confirmed a strong correlation between personal innovativeness, involvement, and the personal adoption of BI systems. The findings are important to the study because

the level of involvement and personal benefit for the manager will determine his or her personal adoption of the BI system; those managers with low levels of involvement or personal benefits will pose challenges in terms of securing their personal adoption and use of the BI system.

Best Practices in Business Intelligence Implementations

Bijker, M., & Hart, M. (2013). *Factors influencing pervasiveness of organisational business intelligence*. BUSTECH 2013 : The Third International Conference on Business Intelligence and Technology (pp. 21-26). Valencia: IARIA. Retrieved from: <http://www.iaria.org/conferences2013/BUSTECH13.html>

Abstract. Organisations can derive great value from the effective use of business intelligence (BI). The pervasive use of BI can help improve decision making by providing business users with relevant information, which will ultimately lead to better organisational performance and efficiency. However, organisations still struggle to derive the full benefits BI has to offer. The purpose of this study is to gain deeper insight into the factors that influence pervasiveness of BI, specifically in South African organisations. This is an inductive, exploratory study with data collected through semi-structured interviews across various industries. Thematic analysis was used in order to determine the main factors contributing to the pervasiveness of BI in the participating organisations. The major themes that emerged included executive buy-in, strong business focus and ownership, perceived value, education, communication and support. An incremental, phased approach when implementing BI and information quality were also prominent themes. These diffusion factors that promote or impede pervasive BI in the organisation are also discussed through the three contexts of the Technology-Organisation-

Environment (TOE) framework. The Organisational context was found to be the strongest influencer of BI pervasiveness in these organisations.

Summary. This study explores BI pervasiveness in five large South African organizations from the retail, insurance, health care, and telecommunications industries. Each of the organizations were determined to have a mature BI system that had been in place 9-15 years prior to the study. The authors interviewed eleven people that held positions at the executive, tactical and operational levels, as well as BI practitioners well versed in BI implementations.

The authors noted specific benefits of BI, which include (a) improvement of key business processes; (b) improved information quality; (c) time and cost savings through automated delivery of information; and (d) reduced IT costs by consolidating data, thereby optimizing storage and improved data processing. The authors concluded that a BI system is regarded as delivering full value when its use is pervasive and defined usage within an organization as (a) enterprise wide versus department; (b) operational versus tactical and strategic; and (c) meeting the needs for right time and real time delivery of data. Given these parameters, the authors defined "pervasive BI" as the ability to deliver the right information at the right time to business users across all levels of the organization, in order to make better decisions in all processes at all times.

The study analyzes the factors of pervasive use and does not focus on factors related to BI adoption. In relation to pervasive factors, the authors introduced the TOE framework, which represents technology-organization-environment. Within this framework, the authors identified five major themes related to BI pervasiveness: (a) senior executive buy-in; (b) business involvement and ownership; (c) education and

support; (d) the importance of an incremental, phased approach; and (e) information quality, form and availability. Key findings include the identification of senior executive buy-in as vital to BI success and the fact that some executives do not realize the diligent and extensive work that must be done to ensure the provision of data of usable and accurate quality, a requirement to produce useful information. The authors identified sub-categories of executive buy-in: (a) executive perception of BI; (b) obtaining executive buy-in; and (c) executive's active use of BI.

Bijker and Hart also identified strong business focus and ownership as critical success factors, noting that the main focus of the initiative should be on the needs of the business. Specific actions included in this best practice are: (a) establish business ownership, (b) obtain business buy-in, and (c) understand business need. The different organizations implemented BI system use in various ways including the use of subject matter expert (SME) prototypes and self-service BI.

The authors listed education, communication, and support as key success factors, and noted that organizations with successful BI systems had established dedicated support programs for users. The programs were extensive and taught users specific use of the BI system but also extended and enhanced their knowledge to include the interpretation of the information provided by the BI system and how it can be of valuable use.

Bijker and Hart recommend an incremental, phased approach based upon the study, noting that respondents overwhelmingly agreed that an implementation should be based on a solid architecture and design and that business elements and functions should be introduced in an incremental manner. The preferred method of the respondents is to

introduce areas that will benefit the most stakeholders and bring the most value to the organization.

Finally, the authors listed information quality, format, and availability as key success factors in BI implementations, noting that study participants report that BI delivers extreme value to an organization when needed information is provided in the right format at the right time. The respondents noted that these factors take time and practice to establish, especially when adapting BI functions to varying information needs; however, once established and proven, results can be achieved. Further results from this category include the need for a data warehouse, the right level and format of information, and data quality and availability. Noteworthy highlights include the fact that the business users are not always certain about the information that they need and may struggle to define what accuracy measures are necessary to address their inquiry. Lastly, the authors provided limitations or impacts that deter pervasive use of BI, such as potentially high license costs of BI products, slow performance due to technical infrastructure deficiencies such as low bandwidth, and unreliable data.

Isik, O., Jones, M., & Sidorova, A. (2011). Business intelligence (BI) success and the role of BI capabilities. *Intelligent Systems in Accounting, Finance and Management*, 161-176. doi: 10.1002/isaf.329

Abstract. Business intelligence (BI) has become the top priority for many organizations who have implemented BI solutions to improve their decision-making process. Yet, not all BI initiatives have fulfilled the expectations. We suggest that one of the reasons for failure is the lack of an understanding of the critical factors that define the success of BI applications, and that BI capabilities are among those critical factors. We present findings

from a survey of 116 BI professionals that provides a snapshot of user satisfaction with various BI capabilities and the relationship between these capabilities and user satisfaction with BI. Our findings suggest that users are generally satisfied with BI overall and with BI capabilities. However, the BI capabilities with which they are most satisfied are not necessarily the ones that are the most strongly related to BI success. Of the five capabilities that were the most highly correlated with overall satisfaction with BI, only one was specifically related to data. Another interesting finding implies that, although users are not highly satisfied with the level of interaction of BI with other systems, this capability is highly correlated with BI success. Implications of these findings for the successful use and management of BI are discussed.

Summary. The authors explore the correlation between BI success and BI system capabilities, noting that not all initiatives fulfilled the expectation of improved decision making. BI system capabilities were defined as critical functions that help an organization improve performance and respond to change. The study was completed by reviewing literature and through survey responses from 166 BI professionals, identified as business managers who use BI for strategic, tactical and operational decision making. The authors note that failures occur when organizations make the decision to implement a BI system without a firm understanding of the critical capabilities that will define their successful use and benefit of the system. Success was generally achieved when organizations managed to link BI system capabilities with the overall business strategy.

The authors identified ten BI capabilities: (a) quantitative data quality; (b) qualitative data quality; (c) internal data reliability; (d) external data reliability; (e) internal data source quality; (f) external data source quality; (g) interaction with other

systems; (h) user access; (i) flexibility; and (j) risk management support. The findings indicate that users experience the most satisfaction with internal and quantitative data capabilities, and are least satisfied with external data capabilities. The authors also found that there are lower levels of satisfaction with regard to advanced BI capabilities such as interaction with other systems and external data reliability; however, the authors also point out that although less than half of respondents were satisfied with the capabilities of their BI systems in these areas, the ability of a BI system to interact with other systems was highly correlated with overall satisfaction with the BI system.

Khan, A., Amin, N., & Lambrou, N. (2010). *Drivers and barriers to business intelligence adoption: A case of pakistan*. European and Mediterranean Conference on Information Systems, (pp. 1-23). Abu Dhabi. Retrived from:

http://emcis.eu/Emcis_archive/EMCIS/EMCIS2010/_private/Accepted%20Refereed%20papers.htm#Track: E-Government_and_IT_in_Public_Sector

Abstract. This research project deals with the Drivers and Barriers to Business Intelligence Adoption. The Drivers and Barrier Methodology (DBM) is a useful tool for measuring how a particular technology such as Business Intelligence (BI) brings tangible benefits to a business enterprise such as a Consumer Bank or Telecommunications Company. This research helps us determine the key factors which force a company to adopt a certain technology and at the same time points out likely impediments and road blocks on the path to successful project completion. A previous body of work both on DBM and on the vast amount of research done in the domain of Business Intelligence and Data warehousing is used as foundation for this research project. A case of Pakistan is used apply the aforementioned methodolgy [*sic*]. The research concludes that depending

on a specific [*sic*] user type such as a Power user, IT User or Business user a 'peculiar preference' in drivers and unique aversion to barriers exist. The challenges and problems faced at each step of the adoption cycle are also highlighted. The findings provide valuable recommendations to application designers, IT Vendors, business analysts, marketers and solution providers.

Summary. The purpose of this paper is to explore the key factors that motivate an organization to adopt certain information technologies. According to the authors, the research objectives are to (a) conduct research that does not favor a particular vendor or industry analyst and is rooted in academic research; (b) conduct a literature review; and (c) validate previous research regarding drivers of and barriers to BI and introduce new criteria in these categories. The study is based on organizations within Pakistan and is derived from survey responses from industry personnel. Despite this country-specific focus, the authors state that the findings surrounding BI implementation are applicable and useful given that IT concepts, unlike legal and marketing subjects, tend to have a global impact.

The authors note that more organizations are taking a data driven approach to decision making. At the same time, the organizations are building vast data collections that serve little purpose and do not provide any insights into customers. Enter a BI system to store, aggregate, and analyze the collections. Data explosion drove the need for BI development and most companies are challenged with the decision to adopt BI. A good start for any business in making this decision is to understand the BI needs of the organization.

The authors define barriers as restrictions to BI adoption, while drivers encourage adoption of the BI system. The authors posited that organizational commitment is a vital driver in any implementation. The authors provided two key barriers cited from a 2009 study as the cost and complexity of BI systems. Additionally, the authors note that data migration and integration are the most potent barriers to BI adoption; additionally, these activities also account for 40% of BI implementation costs. The authors shared common barriers including: (a) the existence of department silos, marked as the most significant barrier; (b) dirty data; (c) resistance by staff towards the new BI system; (d) failure by the organization to involve the CIO in decision making; (e) usability versus features mismatch; too many features offered but too few being used; (f) unnecessary focus on metadata; (g) the expense of BI consulting services; (h) high and complex maintenance cost structures; and (i) the notion that one must select name brand products, ignoring other viable options.

With regard to the adoption of BI systems, the authors note that adoption can be passive or active. To measure adoption the authors recommend the identification of a single factor to determine if adoption has occurred and a scale to measure the commitment of the organization towards adoption. Additionally, the authors note that adopters are of different classifications according to their adoption rate: early, late, and non-adopters. By identifying drivers and motivators and applying a methodology developed by the authors, the authors state that organizations can identify and evaluate which BI solutions outputs have the most impact and then choose the items on which to focus their attention and which items can be ignored.

Finally, the authors provide the concept of nature of use where individual users determine their personal value for new BI systems based on their own individual use. This information is helpful because action adoption and successful use of the new BI system by staff is the final determinant of a successful BI project. Additionally, the authors recommend that organizations consider a successful project as incorporating a balance between processes, systems, people, and organizational culture.

Kokin, S., & Wang, T. (2013). Development of business intelligence success evaluation framework. *Journal of Applied Sciences* , 1657-1660. doi: 10.3923/jas.2013.1657.1660

Abstract. The present study proposes a new theoretical framework for examining relationship between Business Intelligence (BI) Capabilities and Business Intelligence (BI) Success from the positions of Information System Success theory. A lot of attention was paid to the quality of issues of BI Capabilities due to the theoretical background of IS Success Theory, especially De Lone and McLean IS Success model. Most of the hypothesized relationships were confirmed. The results of the present research suggest that BI capabilities in the context of proposed framework are critically important to BI Success. Organizations, exploiting BI systems, should pay attention to the implementation of the abovementioned BI Capabilities. Another important notion is that the difference in the quality of these BI Capabilities may explain the success and failure of the BI implementation projects. These results are consistent with the previous research in the academic field. This study is relevant to both researchers and practitioners. This study proposes to extend current research in BI and provide a parsimonious and intuitive model for explaining the relationship between BI success and BI capabilities based on the previous research in the field of Information Systems (IS) Success.

Summary. This research article focuses on the correlation between BI capabilities and BI success. The authors describe BI capabilities as data type quality, data source quality, user access quality, ease of interaction with other systems, and system flexibility. The authors define BI success as the positive benefits that organizations realize from their BI investments. The authors made note that there is no specific criterion for success for BI, as each unique and individual organization determines their own measurements for success. These unique measurements are generally derived from the expected benefits that originally motivated the implementation of BI, such as to improve decision making through robust reporting. The authors tested eleven hypotheses and confirmed seven. Findings useful to this study include the confirmation of the correlation between (a) ease of interaction with other systems and BI flexibility (i.e., system adaptability to various uses and business conditions) and (b) the critical importance of data quality to BI success. The authors emphasized data quality since a BI system integrates with other systems and extracts data to output reports, and thus the quality of data affects the accuracy and completeness of the information output.

Papadopoulou, T., & Panagiotis, K. (2010). A path to the successful implementation of Business Intelligence: An example from the Hellenic Banking sector. *OR Insight*, 15-26. doi: 10.1057/ori.2009.14

Abstract. This article is concerned with the implementation of Business Intelligence (BI), presenting an example from the Hellenic Banking sector. By viewing the implementation as a socio-technical process, the article suggests that any successful implementation of BI is depended on the ability of managers to identify, and be persistent in following, a trajectory 'path' that starts from data and reaches the final recipients of the

information high on the organizational pyramid. Along this path implementers should retain a high level of awareness regarding multiple social and technical issues that may arise during this trajectory. With this in mind, and by focusing on the implementation journey, the example illustrates a pragmatic and practical approach for eliminating pitfalls that may hinder the successful outcome of such initiatives.

Summary. This article provides a case study examination of a BI system implementation at a bank in Greece. The authors posit that a BI system implementation is a social-technical process and to be successful managers must identify a solid path from raw data to information that reaches the final recipients and contributes to the overall business strategy. The authors note that businesses seek information from their IT systems that is adequate, timely, and reliable; however, IT systems are often unable to meet this need efficiently due to inflexible legacy systems or scattered data stores. Given this challenge, businesses seek out a BI system to remedy data consolidation and access issues, thus delivering robust information to make key decisions.

The authors build upon previous literature that identifies lists of critical success factors to provide additional knowledge in the form of implementation phases and a recommended path to successful implementation. The authors identify the most important aspect of a BI implementation as data, noting that organizations must have available and robust data that can be accessed and processed, otherwise a BI system is useless. Following data on level of importance are stakeholders, the actual BI system, organization structure, and link to business strategy.

The six phases of implementation recommended by the authors are: (a) identify user requirements, (b) determine data retrieval methods; (c) test the prototype; (d)

implementation; (e) user training; and (f) system roll-out. The first step, identifying user requirements, is the most complex and time-consuming step because it requires the reconciliation and prioritization of multiple viewpoints from multiple sources within the organization; however, once finalized it provides the basis for a successful implementation. The overarching lesson to be learned is that a successful implementation is dependent on identifying and factoring the diverging and conflicting needs of multiple stakeholder groups within the organization that will use the BI system.

Yeoh, W., Koronios, A., & Gao, J. (2008). Managing the implementation of business intelligence systems: a critical success factors framework. *International Journal of Enterprise Information Systems*, 79-94. Stable URL: <http://go.galegroup.com/ps/i.do?id=GALE%7CA191817842&v=2.1&u=s8492775&it=r&p=AONE&sw=w&asid=622200de0d9fca8c522985624ee2c85f>

Abstract. The implementation of a BI system is a complex undertaking requiring considerable resources. Yet there is a limited authoritative set of CSFs for management reference. This article represents a first step of filling in the research gap. The authors utilized the Delphi method to conduct three rounds of studies with 15 BI system experts in the domain of engineering asset management organizations. The study develops a CSFs framework that consists of seven factors and associated contextual elements crucial for BI systems implementation. The CSFs are committed management support and sponsorship, business user-oriented change management, clear business vision and well-established case, business-driven methodology and project management, business-centric championship and balanced project team composition, strategic and extensible technical framework, and sustainable data quality and governance framework. This CSFs

framework allows BI stakeholders to holistically understand the critical factors that influence implementation success of BI systems.

Summary. This study establishes seven critical success factors crucial to the implementation of BI systems. The study is based on the Delphi method and was derived from three-rounds of studies with BI experts. This method was selected by the authors because it allows them to gather subjective judgements, which are then moderated and regulated by group consensus. The sample of experts was taken from engineering asset management organizations in the United States and Australia that specialize in public utilities, rail service, and telecommunications. Under the Delphi method, a list of critical success factors was finalized through a structured questionnaire survey where participants ranked a larger list of critical success factors as: (a) not important; (b) of little importance; (c) important; (d) very important; and (e) critically important. This approach singled out factors that participants ranked as just important from those considered critically important.

The critical success factors established by the authors are: (a) committed management support and sponsorship; (b) business user-oriented change management; (c) clear business vision and well-established business case; (d) business-driven methodology and project management; (e) a business-centric champion and balanced project team composition; (f) strategic and extensible technical framework; and (g) sustainable data quality and governance framework. This list provides those planning BI implementations with a targeted list of best practices on which to focus for project success.

Lessons Learned from Local Government Information Technology Projects

Boselli, R., Cesarini, M., & Mezzanzanic, M. (2011). *Public service intelligence: evaluating how the public sector can exploit decision support systems*. International RESER Conference (pp. 1-18). Hamburg: RESER. Retrieved from:

www.reser.net/materiali/priloge/slo/cesarini_et_al.pdf

Abstract. This paper aims at exploring how ICTs can improve decision-making processes and subsequently service performances in public sector services. The authors focus on a specific class of Information Systems: Decision Support Systems (DSS) and Business Intelligence (BI). The research presented will lay the ground for investigating how the impact of these technologies on public services can be evaluated. The paper identifies the key factors influencing BI and DSS adoption and value generation in the public sector, focusing on a literature review. Furthermore, drawing on the identified key factors, the paper proposes a framework with the aim of identifying specific public service sectors where BI and DSS adoption could provide effective results.

Summary. This article is based on a literature review to identify factors that are either a barrier or driver for the adoption of BI and Decision Support System technologies in the private sector, then whether those identified factors are a sound fit for public sector adoption. The authors also sought to identify if the methods to evaluate BI and DSS adoption in the private sector can be replicated in the public sector. The authors highlight the fact that public sector entities are pressured by their constituencies to deliver needed services in efficient and highly cost effective manners – essentially doing more with less. Constituencies also expect innovative adjustments to government programs to improve service delivery.

The authors note that information and communication technologies (ICTs) have been essential technological tools that public entities have utilized to support service delivery; however, the ICT contribution to improved decision making with regard to public programs has not been widely studied. The authors state that in order to achieve improved service delivery and reduced operating costs, public administrators must make sound decisions and obtain accurate measurements of various programs, and note that BI systems can facilitate this objective. In addition, a BI system provides public administrators and managers with innovative features such as dashboards and scorecards that track performance and budgets; additionally, the tools can be programmed to track specific metrics and provide alerts when predetermined thresholds have been reached or are projected to be reached. BI adoption improves data quality within the government organization by integrating administrative archives and data stores into a single data repository available for analysis.

The authors find that evaluating the effectiveness of a BI system is complex and there is no single framework within the literature to accomplish the task. The return-on-investment analysis employed by the private sector is not a valid measurement for public BI implementations given that public entities are not driven to maximize profits. Considering this factor, the authors note that the evaluation by public entities of a BI system's overall benefit must consider other factors such as cost reduction and the improvement of service delivery, as well as the improvement of the public's perception of and satisfaction with services. Lastly, simply evaluating implementation and labor costs does not provide a complete picture of the success of a public entity BI implementation, as BI systems provide intangible benefits that are non-financial in nature, such as

improving the quality and timeliness of information delivery. The authors state that the evaluation of the success of a BI implementation within the public sector must be more robust and inclusive of financial, non-financial, and programmatic aspects.

Hartley, M., & Seymour, L. (2015). *Key success factors for implementing Business Intelligence in South African public sector organisations*. 9th IDIA Conference, IDIA2015 (pp. 249-265). Nungwi: IDIA. Retrived from:

<http://www.developmentinformatics.org/conferences/2015/papers/17-Hartley-Seymour.pdf>

Abstract. Business Intelligence (BI) has been rated as a key application and technology investment which provides organisations with great value by improving their decision making processes. The public sector provides a case for implementing BI for improved decision making processes as a way of enhancing its service delivery. However, the implementation of BI in these organisations have revealed to be quite a complex task to undertake. This research paper sets out to explore the implementation of BI in the public sector in South Africa. The research was conducted through two case studies and data was collected by conducting semi-structured interviews and document collection with organisations that are implementing BI. A qualitative thematic analysis method was then used to construct the major themes that emerged from the data. The study revealed that BI can be used as an enabler of change and improvement in public sector activities. Consolidating structures, systems and processes was identified as a precursor to implementing it, while the use of the BI initiative to support organisational strategic objectives was seen as ensuring executive buy-in. However, the level of skills needed to use BI tools was highlighted as key factor in hindering its use in these organisations. ICT

has furthermore more been identified as being an important factor for the promotion of development and equitable access to public services.

Summary. The authors study the implementation of BI projects at two South African locations, a provincial government and a local government. The authors interviewed executive and organizational staff at both locations. The study revealed themes that relate to the successful implementation of BI in local governments. The following six themes contribute to this current study: (a) preparing the data within existing IT systems for integration with the new BI system, which includes consolidating or modifying existing data structures; (b) adapting the organizational strategy to BI system capabilities; (c) ensuring the organizational culture is prepared for the adoption and use of the BI system; (d) making business process improvements that support the inclusion of BI systems; (e) ensuring adequate staffing and skills for the BI implementations; and (f) ensure management continually promotes the ongoing utilization of the BI system.

Jurisch, M., Ikas, C., Wolf, P., & Krcmar, H. (2014). Key differences of private and public sector business process change. *e-Service Journal*, 3-27. ISSN: 1528-8226

Abstract. The public sector is subject to constant changes. In order to tackle the current financial, social, and political challenges, public sector organizations all over the world need to rethink, adapt, and change their underlying service processes. Prompted by these challenges public managers have turned to the private sector for solutions. By facilitating resource efficiency and allowing for a more straightforward way of service provision, business process change (BPC) assumes a leading role in the transformation of public administrations. Yet, in the past decades many BPC projects both in private and in public have failed to realize their objectives. However, the public sector should not only learn

from its own failures, but also from the mistakes made in private sector BPC implementations. A huge amount of case studies exist on the topic of BPC which provide comprehensive reviews of past failures and successes. So far, this rich pool of knowledge has remained unexploited. This paper identifies the main differences between private and public sector BPC implementations as reported in 128 case studies. Based on this meta-case analysis, we juxtapose current consensuses as well as contentious issues.

Summary. Within the field of research covering business process change, there is a divide where one group of researchers suggests the public sector learn from the private sector and the other group advocates change models within the public arena. The authors of this current study do not favor one side over the other, but rather conclude that both sides can learn valuable lessons from the other. The initial research purpose was to identify the difference between business process change in the public and private sectors through an examination of published accounts of change projects documented in 128 case studies (92 private sector and 36 public) occurring between 1993 – 2012. Before proceeding, however, the authors note that in this study, many of the case studies examined were of successful change projects; therefore, the authors state that the findings may contain a slight bias.

The authors note that both entities are driven to change by three common goals: (a) reduction of costs, (b) reduction of cycle times, and (c) improvement of product and service quality; however, the public sector is under constant change in response to legislative, economic, and environmental influences. In response, public organizations need to quickly adapt, rethink, and reengineer their existing programs and processes. When faced with the burdens of budget cuts and the demand to increase operational

efficiency, public entities turned to the private sector, thus the business process change concept was introduced into the public sector. The authors note that an environment driven by strong management support, change management structure, and project management concepts fosters successful change. This is applicable to both public and private environments even though their change motivations are different. For example, private entities tend to be motivated to satisfy customer needs, whereas public entities are driven to meet their operating mission. Public entities must enact change within a limited budget, and competing and often inconsistent interests. For example, public administrations cannot easily reduce public safety personnel, as the public will view this move as detrimental to overall public safety.

Change management is described as the process an organization must complete to ensure modifications within an organization are done in a visible, controlled, and orderly manner. Critical change management elements include: (a) intensive training for employees to minimize resistance and provide psychological reinforcement in support of the change and (b) effective communication. With regard to change management concepts, a change initiative is not likely to be successful if the organizational structure, including staff, are not prepared for or are incapable of change.

The budget and resources also lend themselves to project success. Due to their annual budget forecasting and preparation, public entities do a better job of scheduling their resources for a change project. This includes financial resources as well as intangible resources like human talent in the form of key staff members with strong business acumen (i.e., knowledge, skill, know-how, and talent). Veteran public sector employees are valuable resources for a change project given their vast understandings of

the government culture, structure and business processes. Additionally, with regard to acquiring necessary financial support for the project, public entities experienced little difficulty in comparison to private entities. This is attributed to the budget process inherent within government operations that requires adequate and strong justification for projects supported by public funds. Risky projects are generally not approved by the legislative body without a reasonable expectation that they will benefit the public in some form – either through improving an administrative function or increasing the service delivery of a program. This does not imply that the planned budgets are always sufficient to cover all project costs, but rather that the process is more inclined to create a reasonable plan.

The study also provides additional points such as confirming the value of external consultants to train employees, assist in the new transition, and contribute to the successful transfer of knowledge. The authors also note the issue of interdepartmental cooperation within public entities, where such cooperation is limited, despite the necessity of and benefit to achieving the project goals. This condition is attributed to rivalries between departments and information systems that are not integrated. Without pressure from the top, departments are reluctant to share information with other departments. Lastly, public change projects are more volatile given that public entities experience more change at the top through elections and appointments; therefore, the projects could experience potential scope changes or cancellation due to different strategies of changing administrations.

Kamal, M., Bigdeli, A., Themistocleous, M., & Morabito, V. (2015). Investigating factors influencing local government decision makers while adopting integration technologies (IntTech). *Information & Management*, 135-150. doi: 10.1016/j.im.2014.06.007

Abstract. The emergence of innovative and revolutionary Integration Technologies (IntTech) has highly influenced the local government authorities (LGAs) in their decision-making process. LGAs that plan to adopt such IntTech may consider this as a serious investment. Advocates, however, claim that such IntTech have emerged to overcome the integration problems at all levels (e.g. data, object and process). With the emergence of electronic government (e-Government), LGAs have turned to IntTech to fully automate and offer their services on-line and integrate their IT infrastructures. While earlier research on the adoption of IntTech has considered several factors (e.g. pressure, technological, support, and financial), inadequate attention and resources have been applied in systematically investigating the individual, decision and organisational context factors, influencing top management's decisions for adopting IntTech in LGAs. It is a highly considered phenomenon that the success of an organisation's operations relies heavily on understanding an individual's attitudes and behaviours, the surrounding context and the type of decisions taken. Based on empirical evidence gathered through two intensive case studies, this paper attempts to investigate the factors that influence decision makers while adopting IntTech. The findings illustrate two different doctrines—one inclined and receptive towards taking risky decisions, the other disinclined. Several underlying rationales can be attributed to such mind-sets in LGAs. The authors aim to contribute to the body of knowledge by exploring the factors influencing top

management's decision-making process while adopting IntTech vital for facilitating LGAs' operational reforms.

Summary. This article details a case study of two local governments in the UK and focuses on the decision-making processes of senior managers as they relate to IT implementations. The authors contend that there is limited research that examines this area of local government IT implementation; however, given the extreme importance of management support and decisions within these projects, such a study lends value.

Within this new millennium, local governments have pioneered e-government applications that allow citizenry and other constituents to complete government business online. The overarching technology explored within the study is integration technology (IntTech). The authors note that recently governments in the European Union, including the United Kingdom, have increased their IT investment. Specific drivers for the increase include: operational efficiency gains, innovation in service delivery, and seamless IT operations. Additionally, local government's innovation plans are often related to modernizing decision making and improving the IT infrastructure and delivery of service.

Previous research that explored the adoption of IntTech considered several factors including: (a) internal and external pressures; (b) technological areas including data security, IT sophistication, and the need to align business processes and agilities with IT; (c) support from senior leadership; (d) financial returns such as reduced expenses and ROI; and (e) organizational factors that are beneficial for the organization such as increase in efficiency, agility, and flexibility of processes. The authors note that there are also barriers that make it difficult to institute changes within local governments such as

those related to the diversity of internal and external stakeholders and the bureaucratic and rigid hierarchical government structure.

The authors conducted the study to explore the decision-making process with regard to organizational change and the decision makers responsible for the change. The authors explore the need to understand the decision maker's attitude, behavior, and decision-making process in response to the following factors: (a) individual, such as knowledge of integration technology, managerial capability, and level of authority; (b) decision making, such as centralized and decentralized decision making; and (c) organizational, such as style of management. Decision making within an organization is categorized as (a) strategic decision-making, (b) decision making by group, and (c) decision making by individual. The authors studied individual decision making traits, including (a) personality, (b) perception, (c) attitude toward risk, (d) ethics and values, (e) knowledge of integration technology, and (f) managerial capabilities and authority. The authors also explore decision-making as it is related to organizational factors including (a) culture and climate, (b) politics, (c) management style, and (d) organizational compatibility. The authors attribute the slow evolution of new IT integration at the local government level, with an average lag time of ten years, to bureaucratic natures and climates that are generally risk averse.

Moon, M., Lee, J., & Roh, C.-Y. (2014). The evolution of internal IT applications and e-government studies in public administration research themes and methods.

Administration & Society, 3-36. doi: 10.1177/0095399712459723

Abstract. This study reviews research themes and methods used in information technology (IT) in government and e-government research. Although IT/e-government

studies (including inward aspects of IT applications in government and e-government studies) continue to increase, they are not comprehensively understood as a subfield within public administration. Based on Rosenbloom's three competing approaches to public administration (managerial, political, and legal), we investigated the major research themes of IT/e-government studies in public administration. We analyzed 248 IT/egovernment articles published in six major public administration journals from 1965 to 2010 to examine IT/e-government research trends in terms of research themes and methods.

Summary. This study is a literature review of articles that pertain to studies of methods in e-government and other government IT projects. The authors reviewed a multitude of articles from 1965 – 2010. The authors separated the two subjects – IT in government and e-government research – into two distinct focus areas. The overarching purpose of the study is to understand the evolution of IT in government as described in the literature. The authors note the evolution of IT in government from its beginning as a means to deliver internal services such as automated accounting, to later delivering external services such as automated interactions with outside entities including vendors and the public. The authors categorized findings of the topics into three approaches within the public administration field: political, managerial, and legal aspects.

The authors note that the nature of government, specifically administration, causes administrators to balance competing interests within operational and political considerations. Administrators must respond with tact and be accountable for their decisions as they relate to their overall service as stewards to the public and the authority of the executive and legislative branches that establish the government hierarchy. The

authors note that IT approaches in government center on the contrast between centralized and decentralized decision making, red tape, and delivery of public service.

Moon, Lee and Roh also discovered that some scholars argue that IT increased central decision making within local governments by flowing information from the bottom tiers of the organization to the top. Other studies propose that midlevel managers and lower tier employees control decision making by being responsible for their own information processing, and thus decentralizing decision making. In regard to red tape, some scholars have noted that IT has become a mechanism to reduce red tape through workflow and rules governing system processing and access permissions.

Nycz, M., & Pólkowski, Z. (2015). *Business intelligence in a local government unit*. Proceedings of Informing Science & IT Education Conference (InSITE) (pp. 301-311). Tampa:

Informing Science Institute. Retrieved from:

<http://Proceedings.InformingScience.org/InSITE2015/InSITE15p301-311Nycz1528.pdf>

Abstract. Business Intelligence is an important tool to improve business processes. More and more companies, government units use BI. But there are not still so many solutions which can be applied in local government units. For this reason the paper has been devoted to the supporting managerial decision-making processes in the Polkowice commune, Poland using BI technology. It consists of the following parts. After a brief introduction to the matter of local government units, the problem statement, the goal of study, research questions, methodology were presented. The next part has been devoted to short presentation of main tasks of the local government units on the example of the Polkowice Community. Then the role of BI in a local government unit has been shown. In the next part Business Intelligence is recommended as a modern technology supporting

management within local government units and it is shown where, which area of their activity should be supported by the BI technology. The conclusion and contribution end the paper.

Summary. This article is a case study of a business intelligence implementation by a local government in Poland. The project was in response to the Polish government's Strategy for Sustainable Development that called for the implementation of information technology solutions. With their research questions the authors attempted to determine why a local government requires BI and how BI can play a role in local government operations as they relate to the planning and effective utilization of resources. The authors posited that the overarching goals of public entities should be to strive for efficiency and an increase in the effectiveness of the government operations. Public administrators should introduce new information technologies to achieve these goals through the use of advanced systems to manage knowledge and information.

To justify the requirement for local governments to utilize BI, the authors noted that organizations acquire vast amounts of data that is of great benefit to the operation. In order to benefit from the information a BI system is needed to efficiently process the data into useable information. Under the right conditions, the organization will be well informed to foresee upcoming changes in the environment or in customer requirements and then can respond in a proactive fashion. Specific areas of government operations that can benefit from BI are: (a) measurement, management and reporting on performance; (b) logistics; (c) formation of policy; (d) planning and budgeting; (e) statutory reporting and best value; (f) public information; and (g) exploration of hidden relationships within data.

The BI system will provide local government users and decision makers with the information to address these areas and/or detect significant trends or patterns. Currently local governments utilize many different information systems, which are often not interconnected. A BI system will not only integrate and unite data stores within each system, but will also extract more robust information. Specifically, the authors contend that current systems are unsuitable for robust analysis and data extraction, are more suited to basic tasks such as information collection and other low data processing, only store current information, and are ill-equipped to manage and process large data chunks. The current systems also do not capture changes that occur within particular fields.

Additionally, a BI system also provides certain benefits for data management and information processing including: (a) integration of data from multiple sources into one; (b) various possibilities to manipulate data; (c) various report deliverables, such as graphs, tables, standard reports, and development of ad hoc presentations; (d) ease of use and (e) data security. Lastly, the authors concluded that given the benefits of a BI system to generate robust reports that will be useful to manage government operations, and given the fact the BI is not widely used in local governments, a BI system should be made available to all departments that participate in the management process.

Savoldelli, A., Codagnone, C., & Misuraca, G. (2014). Understanding the e-government paradox: Learning from literature and practice on barriers to adoption. *Government Information Quarterly*, 63-71. doi: 10.1016/j.giq.2014.01.008

Abstract. We have identified a paradox in the still low adoption of e-government after more than two decades of policy efforts and public investments for the deployment of online public services. Using as evidence the focus and evolution of this focus over the

period 1994–2013 in a vast body of literature produced by academia, international organisations and practitioners, we show that: a) the deployment of e-government was for a long time concentrated on more technological and operational matters and that only more recently attention switched to broadly defined institutional and political issues (hypothesis 1a); and b) institutional and political barriers are one of the main factors explaining lack of e-government adoption (hypothesis 1b). A decision making process that is still unstructured, untrustworthy, and not fully leveraging the available evidence hinder the perception of public value and citizens' trust in government, which contribute to low level of e-government adoption. We conclude suggesting that a smart government producing public value is grounded in a triangle of good decision defined by politics, values, and evidence and that to achieve it public sector should go beyond the traditional concept of service innovation. It should rather introduce conceptual and systemic innovation pertaining to a new way of thinking and of interacting with stakeholders and citizens as sources of both legitimacy and evidence.

Summary. Within this study, the authors explore through a literature review technology innovations by government, such as e-government programs during 1994-2013. The study is focused on governments in the EU; however, the authors consider the work to have a global reach. Additionally, the materials were limited to countries with mature e-government project deployments. The focus is to explore the recent switch within current research to broad institutional and political factors that affect and influence e-government implementations.

The authors conclude that government projects cannot produce favorable results with acknowledging and considering the complimentary changes that must also occur

within the organization. From the research, the authors identified several barriers to success and categorized them into three main dimensions: (a) technological-operational; (b) managerial-organizational; and (c) political-institutional. Lastly, the authors identified six key barriers within the political-institutional dimension: (a) digital divide; (b) lack of legal basis; (c) lack of policy cycle management; (d) lack of measurement and evaluation; (e) lack of citizen participation; and (f) lack of trust and transparency. Lastly, the authors conclude that good decisions can occur within any domain; however, with respect to government technology projects, public administrators must establish good decisions while balancing the following: (a) politics, decisions amongst competing interests and priorities; (b) values, symbolic and tangible needs and benefits for the constituency targeted by the decisions; and (c) evidence, related to the value the BI system brings to the organization and the effects of political decisions with respect to the targeted values.

Conclusion

Business intelligence systems are robust tools that provide information users with data and reports from across the enterprise by connecting various legacy systems and extracting useful data in a way that is not efficiently possible without a BI system (Harison, 2012). BI implementation projects are complex undertakings for any organization (Harison, 2012). However, despite the challenges, many organizations embark on BI implementations and some yield successful results while others fail to properly adopt the BI systems. As observed in this study, there are few academic sources to guide local government BI implementation projects. The information gleaned from this report will be of use to local governments given that they face the same organizational, technical, and environmental challenges with the implementation of business intelligence systems as their private industry counterparts.

The 15 references in this Annotated Bibliography provide information about BI system implementations and are intended for an audience that includes local government leaders, managers, and IT professionals. The references provide information on the following related topics: (a) challenges in business intelligence implementations, (b) best practices in business intelligence implementations, and (c) lessons learned from local government information technology projects.

Challenges in Business Intelligence Implementations

Yeoh et al. (2008) describe a BI implementation as an iterative process that develops as organizations analyze their information requirements, assess their BI system expectations, and begin implementation. Researchers note various challenges associated with BI implementations. Yeoh et al. (2008) conclude that organization and management challenges pose the greatest deterrent to project success because they are generally outside the direct control of project teams.

Harison (2012) similarly notes that organizational cultures do not always support the introduction and innovative use of new technologies and an organization's staff may ultimately fail to adopt the BI system after implementation. BI systems are loaded with features that some staff may not view as user friendly and, without adequate training, support, and encouragement, they will revert back to familiar programs like Microsoft Access and Excel for their information and reporting needs (Harison, 2012). Isik et al. (2011) note that BI system failure occurs when organizations do not link the BI system capabilities with their BI strategy and also when they fail to define the specific BI uses that will establish a successful implementation.

The high cost of software licenses often serves as a barrier to BI adoption (Bijker & Hart 2013; Khan, Amin, & Lambrou, 2010). Furthermore, users within an organization require varying degrees of information; therefore, multiple functions from multiple BI systems may be required given that a single BI system may not provide solutions to every user's information needs (Isik et al., 2011). Management must then prioritize competing requirements among the users with available resources for BI projects (Isik et al., 2011). Papadopoulou and Panagiotis (2010) recognize the identification of user needs as the most critical and time-consuming aspect of implementation due to the need to reconcile multiple viewpoints and ideas from various users across the organization; the time for this step is necessary as the identified needs serve as the basis for a successful BI project.

Bijker and Hart (2013) notes that slow performance of the BI system due to an inadequate technical infrastructure such as low bandwidth can be a challenge. Other technological challenges of BI systems include making sure the data is reliable and available and ensuring that the BI system can interact with other systems at the data, application, business process and user levels (Isik et al., 2011). Khan et al. (2010) identify data migration and

interaction with other systems as the most potent barriers to BI adoption and success. Kokin and Wang (2013) identify the critical importance of data quality to BI success. However, Yeoh et al. (2008) assert that technical issues are not significant challenges to BI implementation success given that they can be easily resolved via technical solutions.

Best Practices in Business Intelligence Implementations

Multiple researchers identify common business intelligence implementation best practices. Committed management support is noted as critical for the success of BI system implementations and user adoption (Hartley & Seymour, 2015; Jurisch, Ikas, Wolf, & Krcmar, 2014; Wang, 2014; Yeoh et al., 2008). Another key to the success of a BI implementation is to ensure that management has a firm understanding of the impact that the BI system will have on the organization and that the recognized impact is incorporated into business processes and communicated to staff (Harison, 2012; Hartley & Seymour, 2015; Jurisch et al., 2014; Yeoh et al., 2008;). Bijker and Hart (2013) note that organizations must connect BI functionality with the true organizational information needs to ensure there is a viable purpose for the system and identify the critical importance of basing BI decisions in accordance with business plans. Similarly, Isik et al. (2011) identify a strong link to business strategy as important.

Multiple researchers note that a solid understanding of individual user needs related to actual BI system use is critical for a successful implementation and user adoption (Harison, 2012; Hartley & Seymour, 2015; Papadopoulsa & Panagiotis, 2010). Khan et al. (2010) state that the prioritization of critical needs will identify drivers and motivators for the BI system and will enable management to identify the areas that will achieve the greatest impact. Phasing in BI features incrementally, starting with areas of the organization that will benefit the most, will typically ensure that those with the most critical information needs are given priority (Bijker &

Hart, 2013). Bijker and Hart (2013) also suggest that as an effort to promote adoption of the BI system, management must ensure information users understand their information requirements and then focus training and instruction on how to extract the desired information from the BI system.

Other BI implementation success factors include: ensuring a high level of information quality (Isik et al., 2011; Harison, 2012), selecting a high quality BI system (Harison, 2012), computer literate staff (Harison, 2012), and the ability of the BI system to interact with other systems (Isik et al., 2011; Harison, 2012). Additionally, Bijker and Hart (2013) and Harison (2012) emphasize the critical importance of ongoing education and support from internal IT support staff and the help desk. Lastly, Kokin and Wang (2013) identify a significant correlation between BI success and BI capabilities, further emphasizing the importance of understanding the capabilities of the BI system to ensure they meet the organization's information needs.

Lessons Learned from Local Government Information Technology Projects

Several studies identified challenges that are unique to local government IT projects; however, in order to understand the challenges one must also understand the local government operating environment. Boselli, Cesarini, and Mezzanzanic (2011) state that the public sector is under pressure by constituents to deliver needed services in an efficient and cost effective manner. Jurish et al. (2014) state that public entities undergo constant change in response to legislative, environmental, and economic influences. Additionally, Moon et al. (2014) highlight the political, managerial, and legal constraints that local governments must operate within, where public administrators must strike a balance between competing interests within the three areas.

Jurish et al. (2014) note that while private sector organizations are driven to change in response to customer needs, public entities are driven to meet their operating missions. Despite

the different operating environment from their private sector counterparts, local government leaders and managers still want to improve decision making and the delivery of services and obtain accurate measurements of the operation (Boselli et al., 2011; Nycz & Pólkowski, 2015). A BI system can provide these abilities to a local government, as the need for robust information and the use of various non-interconnected IT systems is just as prevalent in government as in the private sector (Nycz & Pólkowski, 2015).

Implementation challenges of local government IT projects often stem from lack of inter-governmental cooperation between departments, where departments will not share information with each other without pressure from top leadership (Hartley & Seymour, 2015; Jurisch et al., 2014). Additionally, the fulfillment of IT projects can be volatile due to changes in top officials as a result of elections and appointments, where loss of knowledge can impact the project or new administrators may have different agendas that alter the project scope or cancel the project entirely (Hartley & Seymour, 2015; Jurisch et al., 2014). Savoldelli, Codagnone, and Misuraca (2014) note that administrations must make good decisions while balancing politics, values, and evidence related to organizational performance and past decisions. Kamal, Bigdeli, Themistocleous, and Morabito (2015) also noted that government IT innovation is often slow to develop and linked this problem to the diversity of local government stakeholders, the bureaucratic and rigid hierarchical government structure, and low levels of risk taking by public officials.

There are local government project success stories. Public sector project success rates are higher than those in the private sector, which according to Jurisch et al. (2014) can be attributed to: (a) annual budget planning, where local government leaders do a better job of scheduling project activities and allocating resources, and (b) the requirement by top leadership of strong

justification for the IT system and assurance of success of the related project before public funds are authorized. Local governments are therefore better prepared to undertake complex projects, but Jurisch et al. (2014) contend that there is no preferred method for implementing IT projects between the private and public sector and, in fact, both groups can take lessons from each other.

Summarization

BI systems can be complex products to implement and operate, and local governments face unique challenges when implementing IT projects that are not present for private sector organizations (Hartley & Seymour, 2015; Jurisch et al., 2014). However, with proper guidance and training, local governments can complete a successful implementation and realize the benefits of BI (Harison, 2012). This report outlines the best practices to successfully implement a BI system within a local government operation and improve the chances of BI system adoption. Local governments that succeed in BI implementation and adoption can make better use of their data to improve operations and the delivery of government services (Isik et al., 2011).

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