The Trend of Business Intelligence Adoption and Maturity

Umar Bin Qushem

Department of Information Systems, International Islamic University Malaysia, Kuala Lumpur, Malaysia
umar.overseas14@gmail.com

Adamu Abubakar

Department of Information Systems, International Islamic University Malaysia, Kuala Lumpur,

Malaysia

adamu@iium.edu.my

Akram M. Zeki

Department of Information Systems, International Islamic University Malaysia, Kuala Lumpur, Malaysia
akramzeki@iium.edu.my

Sedat Akleylek

Department of Computer Engineering, Ondokuz Mayıs University, Samsun, Turkey

sedat.akleylek@bil.omu.edu.tr

Abstract— **In this paper, the trend of Business Intelligence (BI) adoption and maturity has been evaluated. Special emphasis was given to the small-to-medium enterprises (SME) business adoption and intensive review of BI maturity model in for the contemporary business world. Therefore, this study surveyed research works that reveal most determinants for BI efficiency. The survey has extract what lead organization to a better understanding of development and testing of BI framework. The study has found out that BI adoption has been highly related to Information and Communication Technology (ICT) tool utilization. Moreover, the success of BI to business are observed when users are able to leverage the best use of their data, by summarizing and aggregating information for business goals. Thus, understanding the fact, an investigation has been approached to identify BI adoption trends towards companies using BI. Results revealed that technology company, as well as a Production company, took the highest in BI adoption.**

Keywords—Data Processing; BI Adoption; BI Maturity; Data Mining; BI Success

I. INTRODUCTION

Today's enterprises require to experience the challenge of responding to turbulent market change, meeting the escalating customer requirements and providing the quality product within a short product lifecycle [1] In recent years, market enthusiasm toward business intelligence (BI) is overwhelming [2, 3] According to [3], BI spending rose 16 percent in 2012 to hit $12.9 billion. Meanwhile, a CIO survey of 251 IT leaders revealed that more than 56 percent of organizations are considering expanding their usage of BI [4]. However, the question is raised that big companies are going ahead while the Small-medium-company are left behind and they are incapable of keeping pace with their big jaunt. This is the reality or fact that most of the companies know the benefits of using BI technologies which are capable of handling large amounts of unstructured data to help identify, develop and otherwise create new strategic business opportunities. The goal of BI is to allow for the easy interpretation of these large volumes of data. Identifying new opportunities and implementing an effective strategy based on insights can provide businesses with a competitive market advantage and long-term stability. Nevertheless, BI technologies provide historical, current and predictive views of business operations.

Common functions of business intelligence technologies are reporting, online analytical processing, analytics, data mining, process mining, complex event processing, business performance management, benchmark-ing, text mining, predictive analytics and prescriptive analytics. BI with an organizational implementation of specific philosophy and methodology referred as working with information and knowledge, easy communication and technology, holistic knowledge sharing along with the effective analytic approach to business processes in organizations should be predominately associated by Decision makers as well as today's organizations. Reviewing the existing literature on BI critically will provide a solid theoretical foundation as well as justification to the body of knowledge [5].

II. ADOPTION OF BI SYSTEM

Adoption of BI System from preliminary ideas include an improve decision-making procedures of top managers and category managers, store managers and supply chain manager, as well as to share information in the company. Heeks Design-Reality Gap model [6-10] as a lens to review the literature and identify obstacles and enablers for BI adoption in public sector organizations is considered. There are various elements of BI adoption: Information, Technology, Process, Objectives and values, Staffing and school, Management and Other resources.

Information: BI and Portal technologies are rapidly moving forward towards more interdependency each other than before. Harley and Seymour [11] mentioned in their research "The measurements of outcomes in public sector environments are typically more qualitative and less structured than resource inputs or delivery activities" [11] and structured information (high degree of organiza-tion) is more easily supported than unstructured infor-mation i.e. email, contacts, and manuals. by BI innovas

Technology: This domain is used as major input in determining or implementing Information system includ-

ing BI. good example of BI technology adoption is the South African Revenue Services (SARC) in South Africa [9]. For future improvement, technology enhancement should focus on the standardization, security, integrity, and big data.

Process: Traditional processes contain elements of how a process perform any kind of activity to accomplish business tasks. Using BI successfully, process reporter must have informed senior official in order to prioritize processes to be used which will lead success for BI adoption.

Objectives and values: As mentioned earlier the perspective of the South African public sector, Pretorious and Schurink [10] prescribed that the change in the public sector is must and administrative mentality change in the public sector is the best option to progress delivery services for producers.

Staffing and school: People who are working in the Business organization, they are in need of training and schooling. Consequently, Government and some public organization trained staffs, creating more opportunity. However, it is also truth, there is no guarantee of jobs in public sector due to private industries or more salaries especially IT industries.

Management system: Management system and structures other resources is another factor of BI adoptions [11] South African Presidential Review Commission

(PRC) [9], revealed that progress of Information Technology (IT) departments in government were slow-moving. In order to make it live, there is need of total transformation of Executive bodies who will be accountable for the business and structures. The decision of Adoption BI should come from the top management whether it is required or not for the organization.

Other resources: Heeks [6] indicated in his Design-Gap Reality Model, money and time should be taken into consideration as other resources.

It is clear enough from Figure 1, that growth of Business Intelligence and reporting tools place after collaboration and communication which emphasizes the entire series of adoption points. On the other hand, it is a requirement to maintain the focus on a collaborative process and workflow till managing series of matrics. This is crucial findings by the experts taken from Rahman's finding [12]. In addition, Customer Relationship Management (CRM), Revenue Management , Demand Management, Supply and Chain Management (SCM) is all considered as highly collaborative tools "that are well suited for automation through BI systems that capture their performance and set the foundation for future gains in efficiency and profitability over time" [12]. Therefore, the success of BI adoption in the organization amplifies the value of management in the organization and helps to upgrade business processes [13].
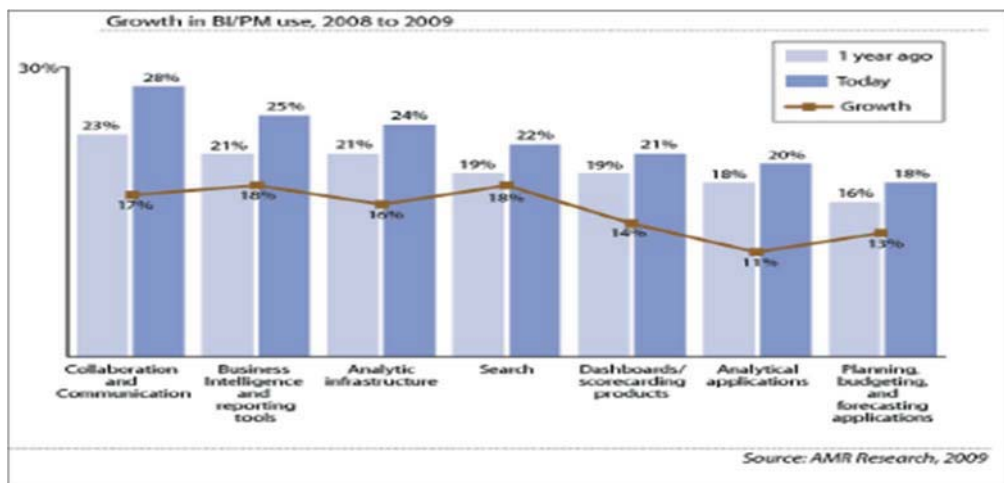

Figure 1. Fortune 1,000 adoption of BI and Performance Management [12]

III. BI SYSTEM MATURITY MODEL

The information maturity level of the organization has a strong effect on BI and needs to be considered before embarking on BI initiatives [14]. The Information Evolution Model proposed by Davis, Miller, and Russel (2006) [15] is a tool that can be used to assess the information maturity of the organization in terms of infrastructure, process, people, and culture.

According to Ventana Research's [16] benchmark report of 308 individuals (involving executives, management, and users across a range of roles and titles working in IT organizations) which was also conducted world-wide, 85 percent responded that their organizations are

still at the lower levels of a maturity chart in their use of BI due to poor usage of advanced BI capabilities [16].

Currently, there are many Maturity Model established by academicians and practitioners to assist the business organization to identify their present position on Maturity of BI, which is nicely summarized in Ong, Pei,

Siew's Model. This model developed based on literature review and from the comparison of other Models what incorporates all major components proposed by Davenport & Harris [18], Sen, Sinha & Ramamurthy [19], Horstmann [20], HP [21], Eckerson [22]. It is the undeniable truth that the greatest value of BI technology is to address the problems using the higher-end analytical BI tools which organization forgets to discover [18]. Most of the Organizations fail to understand taking advantages

and opportunities that exist for them to transform data into knowledge and strategic value [15].

IV. CRITICAL SUCCESS FACTOR OF BI SYSTEM

Literature related review on Critical Success Factor (CSF) for successful BI system is inadequate than other information System research [23]. However, there are already enormous studies took place on BI success factor [24]. Nevertheless, there is also a number of studies conducted to recognize CSFs for the establishment of an information system, such as an ERP system as well as data warehouse and many more system solutions. Therefore, implementation of a BI system is not a straightforward activity entailing merely the integrated software and hardware solutions; instead, it is a complex process that requires suitable infrastructure and resources over a long period [25, 26].

In addition, earlier works discovered the importance of various issues: technical [27] as well as personal, educational, and business. Hence, some authors identify CSFs for BI in the dimensions of organization, environment, and project planning. In the perspective of the organizational dimension, support from top management is considered as the most significant success factor [28, 27, 29]. In particular, Ang and Teo [28] describe that successful implementation completely lies on the strong, persistent commitment of top management. The reason is that management support can overcome political resistance and encourage proactive participation throughout the organization [27]. Hwang, Ku, Yen, and Cheng [29] further reassure that strong executive sponsorship is pivotal to demonstrate the commitment to the BI project, and reinforce the vital linkage of a BI system to business strategy.

In addition, on view of the project dimension, Herrmann [30] states that project planning and standardization of activities and documents are needed to reduce the difficulties in collaborating with other organizational units, as well as to minimize coordination and management costs. Apart from this, the project team needs to ensure that a complete representation of the entire organization occurs within the data warehousing project [31], as the BI initiative always involves a variety of organizational stakeholders over a lengthy period. From the technological perspective, Knox [32] emphasizes that management must focus on building BI data environments based on a central data warehouse that allows direct writing of BI applications, constraining DataMart creation and introducing standards across data repositories.

There is also additional research carried out by Yeoh and Koronios [26] on identifying Business Intelligence Critical success factor where they proposed a CSFs framework for implementation of BI system. It concluded with few highlighted dimension accumulating organiza-tion, process, and technology as the focus point of the Model. However, Yeoh and Koronios also did a qualita-tive with Gao [33], in which authors performed Delphi study covering 15 BI system defining a CSF Model for implementing BI system.

A. Technological Factors

The technological factor is indeed a groundbreaking factor in extending business value and performance. There are many substances used to make it realistic, Business Intelligence is none but one of them. It is prov-en by the Porter and Miller [35] by their research frame-work which proposed to ground measures of IT use and IT performance impact [36- 40, 35]. Apart from this, Delusion of Innovation theory (DOI) used as fundamental innovation theory for many disciplines including sociolo-gy, communication, marketing, education [41, 42] as well as Technology that describes many innovation factors such as relative advantage, compatibility, complexity, trainability and observability influence to determine acceptance or rejection of IT innovation such as Business Intelligence [43]. However, these sourced factors measure of Business Intelligence efficiency in organizations.

Boonsiritomachai, McGrath, & Burgess [44] found that other than those technological factors manager own-er-manager innovativeness and owner-manager IT knowledge is also crucial to ensure Business Intelligence efficiency. Olexová [13] evaluates the impact of two factors for the adoption taken from the Diffusion of Inno-vations Perspective are ease of use and visibility of tech-nical tools towards organization analyzing data approach. Uçaktürk, Uçaktürk, & Ya-vuz [45] highlights better scalability as the technologic factor that using Business Intelligence system organization can handle many data in order to accommodate the company's growth on the efficiency level. Business Intelligence System innova-tiveness will be possible when its technological readiness measured before adaptiveness and collaboration be-tween IT industries are also impacted factor need to include according to Popovič, Turk & Jaklič [46].

A meta–analysis by Tornatzky and Klein [47] un-veils that compatibility, relative advantage and complexi-ty are consistently found to be significant in the prior-reviewed studies. Therefore, this study focuses on those three factors as it is identified most consistent critical technology factor in IS research [48, 49]. Thus, it has taken for its second hypothesis.

B. Process Factors

In determining critical success factors for Business Information System or Business Intelligence system, the process is also a groundbreaking factor that should be taken care of. As it is related to management and environment of Business. In addition, team skills, project management, and strategies, change management are also considered highly influence factors towards the success of any system development [50] The changes of econom-ic environment has guided to an increase of interest in enhancing organizational business processes to improve performance. [51] As a result, individual departments established and absorbed functionally specific technology infrastructure to support decision-making processes as part of strategic goals. [52]

Moreover, the information systems (IS) are playing the vital role in supporting core business processes. In the meantime, organizations focused the growth of their associated transactions accommodating IS applications in

the number as well as variety [52]. It is assumed that there are certain challenges of organizational control over the integration of data and process across networks of enterprise value will be imposed [53] The top management related factors such as change management, organizational structure, management support, project management, and information technology [54] may seek more attention to the needs of users and re-examine the execution of adopted change management strategies in order to allocate an acceptable solutions between the implementation success and perceived business benefits. [55]

Information systems were one area, among many, where the development of technology and its acceptance seemed to be guided by a positive relationship between participation in a decision-making process and implementation success. [56] Therefore, continuous process improvement in the organization is also significantly crucial factor for business to succeed besides its adoption of technology.

C. Organization Factors

As earlier mentioned TOE framework [57], describes organization factor also one of the factors need to consider for Business Intelligence adoption in organizations. After reviewing papers collected for measuring business efficiency, it is found that organizations BI adoption can be affected by many factors. It is therefore need to point out which factors are mostly responsible for determining Business Intelligence efficiency. Porter [35] proposed a framework called as Porter's framework' which can measure of IT use and IT performance impact [36, 37, 38, 39, 40, 35]. According to Hameed [58] existing devoted IT individual and IT, function s within the organization is considered as IS department size, which is strongly connected with the time and labor acquiring a new technology. [29].

Porter [35] in his framework introduced size and time can be a vital factor in Business Intelligence efficiency. This is because company size and time influence each other and even could be mention as an integral part. Big organization has lots of information collected each day from its various customers, processing these data vary from time to time. The bigger size of the company is the more time it needed to produce the informative output for the end customers. Therefore, ultimately these are dependable factors for BI efficiency

Another possible adoption factor of a Business Intelligence Systems (BIS) is absorptive capacity- the capability of key organizational members to employ available or preexisting knowledge [59] to measure the problem for the business success. Likewise, organizational innovativeness observed as the notion of openness to new ideas in respect to company's culture [60].

In addition, vendor selection, better decision, management system and structures are also identified determinants for Business Intelligence efficiency which are suitable to place as organization factors. The similar variable is also IT-staff skills [61]. Professionalism is must and a pivotal predictors of IT adoption in any IT unit according to Jaya-raj, Balser, Chowa, & Griggs [62].

V. RESEARCH METHOD

Considering the aim of identifying the trends of BI Systems adoption and maturity, mostly Malaysian BI sector and other world top BI adopted companies were taken into consideration for investigation. To ensure that the respondents perceived the instruments, a pre-testing of the questionnaire was conducted with two associate professors and two assistant professors from the Faculty of Information and Communication Technology, International Islamic University Malaysia (IIUM) as they were very experienced researchers in the Information Systems (IS) and Business Intelligence Systems (BIS) field.

The data were collected mostly companies who are using Business Intelligence System in Malaysia as well as Foreign BI Companies. However, companies who were invited to participate in the research is those companies are listed MDC Partners - one of the fastest-growing and most influential marketing and communications networks in the world.

VI. ANALYSIS AND DISCUSSION

In the participating organizations, respondents to this survey have been selected from Academician and Big Data Analyst to Chief executive officer (CEO) from BI or Intelligence related departments. Most of the respondents were from subordinates representing 27.3 percent of all respondents. There were 13 respondents (23.6 percent) from Academician, followed by 8 respondents (14.5 percent) from other different level in the position. Additionally, 5 Chief Executive Officer participated in the survey which in total 9.1 percent of all respondents.

Although it is not a crucial point to make whether male or female are having the better understanding of the research topic. Basically, it is just a demographic representation of the data that male participation turned out more around 3/4 of the responses where male contributed 72.7% and on the contrary, female contributed so far 27.3% which considered 1/4 of the portion (see Figure 2).
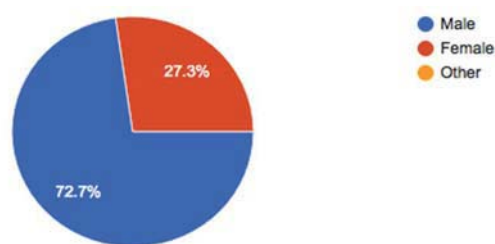

Figure 2: Participation according to Gender

Finding the specific contribution by gender earlier, age group can be drawn more clear views on the profile of the respondents. There are few age groups are specified which are starting age of 15-24 until the age of 55 and above. In Figure 3 graph is clearly shown that respondents are mostly in between 35 to 44 years old. In addition, it is added 40% out of all other respondents. Moreover, age from 25-34 is also the second highest responses in the graph and it can be considered that these people are young professionals in Business Organizations. Lastly, 10.9% is the lowest rate of participation

belongs to 45 and 54 age group in comparison to 12.7% for 55 and above age group and 14.5% for 15-24 age group.
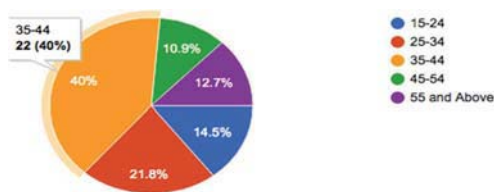

Figure 3: Participation according to Age group

In addition, a wide variety of business organizations were captured in this research. Table 1 shows a higher representation from listed industries that constitute 37 organizations (67.27 percent) whereas non-listed organization comprises of 18 organizations (32.27 percent). It has been seen that IT Application related business organization are the highest respondent who is rated Business Intelligence efficiency.

VII. CONCLUSION

This research provides a significant contribution to the body of knowledge in the area of BI initiative for SME companies as well as BI adopted companies. In addition, It will add value to the Malaysian SME as well as any other organizations to review their bid plan on BI adoption in order to ensure choosing right factor based on the BI trends in Market. Besides, this analysis of demographic factors could contribute to improve further understanding of BI users in varying contexts, and thus lead to more effective BI investments. Moreover, this research also added improvement of the BI studies after identification of critical success factors and maturity.

REFERENCES

1. Lee, C. K., Lau, H. C., Ho, G. T., & Ho, W. (2009). Design and development of agent-based procurement system to enhance business intelligence. Expert Systems with Applications, 36(1), 877-884.
2. Evelson, B., 2012, Top 10 BI predictions for 2013 and beyond [Online]. Available at: http://blogs.forrester.com/boris_evelson/12-12-12-top_10_bi_ predictions_for_2013_and_beyond.
3. Gartner, 2013, Gartner says worldwide business intelligence software revenue to grow 7 percent in 2013 [Online]. Available at: http://www.gartner.com/ newsroom/id/2340216.
4. IDG Enterprise, 2013, CIO magazine tech poll/tech priorities survey [Online]. Available at: http://www.cio.com/documents/pdfs/CIOTechPrioritiesFeb2013. pdf.
5. Levy, Y., & Ellis, T. J. (2006). A systems approach to conduct an effective literature review in support of information systems research. Informing Science: International Journal of an Emerging Transdiscipline, 9(1), 181-212.
6. Heeks, R. (2002). Failure, success and improvisation of information systems projects in developing countries.
7. Hartley, K., & Seymour, L. F. (2011, October). Towards a framework for the adoption of business intelligence in public sector organisations: the case of South Africa. In Proceedings of the South African Institute of Computer Scientists and Information Technologists Conference on Knowledge, Innovation and Leadership in a Diverse, Multidisciplinary Environment (pp. 116-122). ACM.
8. Bucher, T., Gericke, A., & Sigg, S. (2009). Process-centric business intelligence. Business Process Management Journal, 15(3), 408-429.
9. Msimang, M. 2008. Government-wide ICT Infrastructure: The South African Experience. Public Sector ICT Infrastructure Forum, Nigeria, Abuja.
10. Pretorius, D., & Schurink, W. J. (2007). Enhancing service delivery in local government: the case of a district municipality.
11. Hartley, K., & Seymour, L. F. (2011, October). Towards a framework for the adoption of business intelligence in public sector organisations: the case of South Africa. In Proceedings of the South African Institute of Computer Scientists and Information Technologists Conference on Knowledge, Innovation and Leadership in a Diverse, Multidisciplinary Environment (pp. 116-122). ACM.
12. Rahman, S. (2011). The Impact of Adopting "Business Intelligence (BI)" in Organizations.
13. Olexová, C. (2014). Business intelligence adoption: a case study in the retail chain. World Scientific and Engineering Academy and Soceity Transactions on Business and Economics, 11, 95-106.
14. Crossland, M (2010). How Business Intelligence is Adding Business Value. University of Cape Town. Retrieved from https://books.google.com.my/books?id=ot-LXwAACAAJ on 2016
15. Davis, J., Miller, G. J., & Russell, A. (2006). Information revolution: using the information evolution model to grow your business (Vol. 4). John Wiley & Sons.
16. Ventana Research. (2010). "Business intelligence and performance management for the 21st century," Pleasanton, CA, Apr. 2010.
17. Ong, I. L., Siew, P. H., & Wong, S. F. (2011). Assessing organizational business intelligence maturity. In Information Technology and Multimedia (ICIM), International Conference on (pp. 1-6). IEEE.
18. Davenport, T. H., & Harris, J. G. (2007). Competing on analytics: The new science of winning. Harvard Business Press.
19. Sen, A., Sinha, A. P., & Ramamurthy, K. (2006). Data warehousing process maturity: An exploratory study of factors influencing user perceptions. IEEE Transactions on Engineering Management, 53(3), 440-455.
20. Hostmann, B. (2007). BI Competency Centres: Bringing Intelligence to the Business. Business Performance Management, 5(4), 4-10.
21. HP. (2009). The HP business intelligence maturity model: Describing the BI journey [Online]. Available: http://h20195.www2.hp.com/ V2/GetPDF.aspx/4AA1-5467ENW.pdf.
22. Eckerson, W. (2007). TDWI Benchmark Guide: Interpreting Benchmark Scores Using TDWI's Maturity Model. TDWI Research, 3-14.
23. Yeoh, W., Koronios, A., & Gao, J. (2006). Critical Success Factors for the Implementation of Business Intelligence System in Engineering Asset Management Organisations. In Engineering Asset Management (pp. 344-351). Springer London.
24. Scholz, P., Schieder, C., Kurze, C., Gluchowski, P., & Boehringer, M. (2010). Benefits and challenges of business intelligence adoption in small and medium-sized enterprises. In A. Trish, M. Turpin, & J. P. van Deventer (Eds.), .Proceedings of 18th European Conference on Information Systems, ECIS2010.
25. Moss, L., & Atre, S. (2003). Business intelligence roadmap. The complete lifecycle for decision-support applications. Boston: Addison-Wesley.
26. Yeoh, W., & Koronios, A. (2010). Critical success factors for Business Intelligence systems. Journal of Computer Information Systems, 50(3), 23-32.
27. Wixom, B. H., & Watson, H. J. (2001). An empirical investigation of the factors affecting data warehous- ing success. MIS Quarterly, 25(1), 17-41.
28. Ang J & Teo. (2000) Management issues in data warehousing: insights from the Housing and Development Board. Decision Support System, 29(1).
29. Hwang, H. G., Ku, C. Y., Yen, D. V., & Cheng, C. C. (2004). Critical factors influencing the adoption of data warehouse technology: A study of the banking industry in Taiwan. Decision Support Systems, 37(1), 1-21.
30. Herrmann C. (2004). Exploring the Strucutral Dimension of Data Warehouse Organizations: Results of a Survey and Implications. Proceedings of The IFIP TC8/WG8.3 International Conference, Tuscany.

31. Little R & Gibson M. (2003) Perceived influences on implementing data warehousing. IEEE Transactions on Software Engineering, 29(4), 290-296.

32. Knox, M (2004) Asset Managers are Building Their BI Environments, Gartner Research, April.

33. Yeoh, W., Gao, J., & Koronios, A. (2008). Towards a critical success factor framework for implementing business intelligence systems: A delphi study in engineering asset management organizations. In Research and Practical Issues of Enterprise Information Systems II (pp. 1353-1367). Springer US

34. Adamala, S., & Cidrin, L. (2011). Key success factors in business intelligence.

35. Porter, M. E., & Millar, V. E. (1985). How information gives you competitive advantage.

36. Zhu, K., Kraemer, K. L., & Dedrick, J. (2004). Information technology payoff in e-business environments: An international perspective on value creation of e-business in the financial services industry. Journal of Management Information Systems, 21(1), 17-54.

37. Chatterjee, D., Grewal, R., & Sambamurthy, V. (2002). Shaping up for e-commerce: institutional enablers of the organizational assimilation of web technologies. Mis Quarterly, 65-89.

38. Armstrong, C. P., & Sambamurthy, V. (1999). Information technology assimilation in firms: The influence of senior leadership and IT infrastructures. Information systems research, 10(4), 304-327.

39. Tallon, P. P., Kraemer, K. L., & Gurbaxani, V. (2000). Executives' perceptions of the business value of information technology: a process-oriented approach. Journal of Management Information Systems, 16(4), 145-173.

40. Mahmood, M. A., & Soon, S. K. (1991). A comprehensive model for measuring the potential impact of information technology on organizational strategic variables*. Decision Sciences, 22(4), 869-897.

41. Gopalakrishnan, S., & Damanpour, F. (1994). Patterns of generation and adoption of innovation in organizations: Contingency models of innovation attributes. Journal of Engineering and Technology Management, 11(2), 95-116.

42. Premkumar, G., & Ramamurthy, K. (1995). The Role of Interorganizational and Organizational Factors on the Decision Mode for Adoption of Interorganizational Systems*. Decision sciences, 26(3), 303-336.

43. Rogers, E. M. (1995). Diffusion of Innovations The Free Press. New York.

44. Boonsiritomachai, W., McGrath, M., & Burgess, S. (2014). A research framework for the adoption of Business Intelligence by Small and Medium-sized enterprises. In Small Enterprise Association of Australia and New Zealand 27th Annual Seaanz Conference.

45. Uçaktürk, A., Uçaktürk, T., & Yavuz, H. (2015). Possibilities of Usage of Strategic Business Intelligence Systems Based on Databases in Agile Manufacturing. Procedia-Social and Behavioral Sciences, 207, 234-241.

46. Popovič, A., Turk, T., & Jaklič, J. (2010). Conceptual model of business value of business intelligence systems. Management: Journal of Contemporary Management Issues, 15(1), 5-30.

47. Tornatzky, L. G., & Klein, K. J. (1982). Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings. Engineering Management, IEEE Transactions on, (1), 28-45.

48. Jeyaraj, A., Rottman, J. W., & Lacity, M. C. (2006). A review of the predictors, linkages, and biases in IT innovation adoption research. Journal of Information Technology, 21(1), 1-23.

49. Kwon, T. H., & Zmud, R. W. (1987). Unifying the fragmented models of information systems implementation. In Critical issues in information systems research (pp. 227-251). John Wiley & Sons, Inc.

50. Yeoh, W., & Koronios, A. (2010). Critical success factors for business intelligence systems. Journal of computer information systems, 50(3), 23-32.

51. McCormack, K., Willems, J., Van den Bergh, J., Deschoolmeester, D., Willaert, P., Indihar Štemberger, M., et al. (in press). A Global investigation of key turning points in business process maturity. Business Process Management Journal.

52. Hawking, P., & Sellitto, C. (2010, December). Business Intelligence (BI) critical success factors. In 21st Australian Conference on Informafion Systems (pp. 1-3).

53. Malhotra, Y. (2004). Why knowledge management systems fail: enablers and constraints of knowledge management in human enterprises. In Handbook on Knowledge Management 1 (pp. 577-599). Springer Berlin Heidelberg.

54. Chen, I. J., & Popovich, K. (2003). Understanding customer relationship management (CRM) People, process and technology. Business process management journal, 9(5), 672-688.

55. Aladwani, A. M. (2001). Change management strategies for successful ERP implementation. Business Process management journal, 7(3), 266-275.

56. Cook, A. C. (2006). The relationship among personality type, user involvement, and procedural justice in accounting information systems design (Doctoral dissertation, Nova Southeastern University).

57. Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). Processes of technological innovation. Lexington Books.

58. Hameed, M. A., Counsell, S., & Swift, S. (2012). A meta-analysis of relationships between organizational characteristics and IT innovation adoption in organizations. Information & Management, 49 (5), 218-232. doi: 10.1016/j.im.2012.05.002

59. Ramamurthy, K., Sen, A., & Sinha, A. P. (2008). An empirical investigation of the key determinants of data warehouse adoption. Decision Support Systems, 44 (4), 817-841. doi: 10.1016/j.dss.2007.10.006

60. Venkatesh, V., & Bala, H. (2012). Adoption and Impacts of Interorganizational Business Process Standards: Role of Partnering Synergy. Information Systems Research, 23 (4), 1131-1157. doi: 10.1287/isre.1110.0404

61. Bruque-Camara, S., Vargas-Sanchez, A., & Hernandez-Ortiz, M. J. (2004). Organizational determinants of IT adoption in the pharmaceutical distribution sector. European Journal of Information Systems, 13 (2), 133-146. doi: 10.1057/palgrave.ejis.3000490

62. Jeyaraj, A., Balser, D. B., Chowa, C., & Griggs, G. M. (2009). Organizational and institutional determinants of B2C adoption under shifting environments. Journal of Information Technology, 24(3).