Ensuring Success with Analytics in Banks and Financial Services Firms

Chih-hung Mien Liu, National Taiwan University, Taiwan
Xie Ching Kung Meng, Peking University, China
Jürgen Tobias Schneider, University of Vienna, Austria

Corresponding author email: chih-mien@engineer.com

Abstract

Purpose: Big data analytics is a recently available state of the art technology with prospective company influence. Nevertheless, the roadmap for the successful implementation of its as well as the road to exploiting its essential value remains unclear. This particular analysis seeks to make a much deeper understanding of the enablers facilitating BDA implementation in the banking as well as monetary service segment from the viewpoint of interrelations and interdependencies.

Design/Methodology/Approach: We use an integrated approach that incorporates Delphi review, interpretive structural modeling, and fuzzy MICMAC strategy to determine the interactions between enablers, which determine the achievements of BDA implementation. Our integrated strategy uses experts' domain understanding and gains a novel insight into the underlying causal relations regarding enablers, linguistic analysis of the mutual impacts among variables, and including 2 innovative methods for visualizing the outcomes.

Findings: Our findings highlight the primary key role of enabling elements, which includes skilled and technical workforce, financial assistance, infrastructure readiness, and choosing proper major data solutions. These factors have significant driving impacts on various other enablers in a hierarchical design. The results give reliable, easy and robust insights into the characteristics of BDA implementation in banking and monetary service as an entire program, while demonstrating possible influences of all interconnected important elements.

Originality/Value: This analysis explores the primary key enablers for effective BDA implementation in the banking and monetary service sector. More to the point, it reveals the interrelationships of elements by calculating operating and dependence degrees. This specific exploration provides managers with an obvious strategic path toward good BDA implementation.

Keywords: **Big data analytics; Delphi; Interpretive structural modeling; Fuzzy MICMAC; Enablers; Banking along with monetary service.**

1. Introduction

Investment in big data analytics is an important managerial choice for the banking and monetary service sector, not merely due to its potential to generate company worth, but also due to organizational alterations and source commitments that it may come up [12]. BDA may better be identified by considering key qualities of big data, besides encompassing components of equipment, infrastructure, and ways of imagining that inevitably produce managerial insights and add value to the decision-making operation [15]. Based on the IDC Institute's article in 2019, BDA investments are believed to account for 1dolar1 26.3 billion in the BFS sectors. Lately, BFS sectors have begun to grow their BDA teams to meet the increasing requirements. For example, HSBC is preparing to recruit 1,000 data scientists to enhance consumer experience and risk management with the help of BDA [3]. The purchase in BDA has brought huge advantages to BFS firms. JP Morgan Chase, for example, has recognized fraud risk among its customers by checking buying patterns and spending behaviors, while American Express provides customers with their data driven promotions by analyzing customers' social networking information [5].

Regardless of the excellent advantages of BDA for performance and business value, numerous BFS firms remain behind in adopting BDA solutions [15]. One of the more typical troubles is that constantly increasing volumes of information from different sources hinders BFS firms' information acquisition, interpretation capabilities, and processing. Certainly, nearly all, almost all of the helpful banking as well as finance related data hasn't been analyzed for strategic implications to understand managerial choices in service innovation as well as marketing strategies, value co-creation, and personalization [17]. Consequently, BFS managers need many guidance

about how their organizational conditions may best fit BDA implementation.
Prior research has furnished exploratory discussions on the advantages, challenges, and socioeconomic effects of BDA in banking and other research and financial services, which focus on the technical applications and features of BDA in fiscal control.

Specifically, this particular study aims to deal with 3 research questions:
RQ1: What are the primary key enablers of BDA implementation in the BFS context?
RQ2: How are the BDA enablers interrelated, dependent on 2 criteria of dependency driving powers?
RQ3: What's the roadmap ensuring BDA implementation achievement for BFS companies?

The study of ours fills this particular immensely important gap in the literature by leveraging an integrated strategy of Delphi review, interpretive structural modeling as well as fuzzy Matrice d 'Impacts Croises Multiplication Appliquee á un Classement strategy to determine BDA enablers and look at interrelationships with these enablers [4]. By BDA enablers in this particular research, we really mean some elements including organizational or managerial, technology related or maybe data related versions which allow the organization to achieve success in implementing BDA initiatives, covering important aspects from pre adoption measures to implementation phases [17]. Furthermore, the interrelationship among BDA enablers referrers to the connection between important elements depending on 2 criteria of dependency driving powers [6]. Understanding and representing the likely influences between factors that are important offers fresh insights into effectively accomplishing BDA in BFS companies. In this particular vein, the study of ours seeks to advance beyond determining and proposing a summary of verified elements from experts' viewpoint in conditions of checking out the enablers' interdependencies by calculating the driving of theirs as well as dependence powers [20]. To handle the analysis, RQ1: a Delphi analysis is performed to verify the list of the most crucial big data analytics enablers in BFS companies, and to spotlight alternative related context based enablers depending on the expertise and knowledge of domain name experts. To react to the RQ2, we created a version utilizing ISM as a mathematically derived methodology. We additionally directed fuzzy MICMAC analysis to quantitatively evaluate the interdependencies with the enablers, and computed the traveling and reliant energy of all of them. To address RQ3, the modeling procedure of ISM allows structuring a complicated event by using a set of interconnected matrices. Therefore, the complex interrelationships between variables are usually determined and quantified. Innovatively representing considerable inter-connectivity between enablers in suggested frameworks offers a much deeper understanding for academic and providers [7].
This study offers many essential contributions. Largely, it's among the first research to unravel the paths to successful BDA implementation through an integrated as well as structured empirical method [9]. The results recognized in the study of ours offer empirical assistance for BFS companies to use BDA. Second, our analysis provides value to BDA literature by determining the primary key enablers of BDA implementation and checking out the linkages with these enablers to offer an obvious pathway of BDA implementation via incorporating Delphi research with interpretive structural modeling as well as fuzzy MICMAC methodology. Lastly, we offer useful tips to BDA implementation, urging BFS providers to consider these enablers to enjoy much more values from BDA implementation. The paper proceeds as follows: the following part provides the fundamental information and potential impacts of it on the BFS sector. In section three, we show the research design. Results and findings are discussed in section four. Lastly, section five as well as six provide the discussion, implications, future research and limitations.

2. Research Background

Big data analytics was viewed as one of the breakthrough technologies that can deliver strategic and operational company values for companies [12]. Adopting BDA allows banking and monetary service organizations to meet the expectations of their consumers, as well as rejuvenate their business models. Since the financial problem of 2008, BFS firms have already been under intense pressures to act in a fashion conference, stakeholders' expectations, and relevant regulations and laws. Innovative legislations, like the Payments Service Directive, as well as Basel III, ask BFS companies to be transparent and offer access to vast amounts of correct customers' information. On the flip side, brand new technologies like BDA, Internet of Things plus Blockchain have the potential to alter the industry building. BDA is needed together with the goal of obtaining different insights about the company and its surroundings, and so, making much better decisions plus better strategic moves. Many changes resulting from BDA have significantly changed companies, particularly

established businesses in the area of financial services and banking [8].

Sazu et al (2022) argue that big data can alter the entire benefit chain of info in 3 ways: a) about diverse technologies, processes, and people, b) greater amalgamation of solutions for analytics, as well as understanding extraction, and c) depending much more on information scientists as well as analysts to allow for real-time decision and self-service making [28]. Big information is thought to lead to even more effective powerful activities, or perhaps as an empowering stimulus or agent, which allows creating business models [24]. Because of opportunities created by BDA, numerous monopolies have disappeared, and conventional frontiers of companies have eliminated, as well as businesses have the opportunity to get into new manufacturing contexts [30]. So, big companies like Alibaba might go into the financial and banking sector, and by using their big data, they can offer new solutions to their customers, with no requirement to standard banks [30]. Thus, BFS companies should think about great details as a double edged sword to make basic changes in their business strategies [9].

Although most research has shown the advantages of BDA programs, the implementation of BDA tasks is costly and complex. Numerous firms have troubles unveiling the business value of its. This's apparent in reality that approximately 60% of BDA projects fail to do well. Especially in the BFS sphere, research on visiting strategic use of BDA remains in the early stages of its. Little is thought about how important the enablers of BDA implementation are and how they're associated [10]. Consequently, Jahan's study have responded to the call for much more focus on management problems of BDA, which includes checking out the organizational factors which influence the adoption of BDA [28].

Prior studies have investigated the enablers of BDA implementation from technical, data related, and organizational perspectives [1]. Nevertheless, identifying enablers for applying BDA remains inadequate. It's important to enjoy holistic, interdependent, and interrelated sets of BDA enablers, which could provide a deeper understanding of BDA implementation [11]. To this conclusion, fruitful BDA initiatives need an integrated design that discloses the interrelationships between different BDAEs and shows their driving and dependence powers. A mix of Delphi technique, ISM, and fuzzy MICMAC approaches allowed us to finalize and verify the summary of BDAEs in the BFS sphere, extract their interdependencies, and imagine the outcomes [16].

3. Research Design

Because of the holistic and exploratory nature of the research, we employed an incorporated multi-method strategy that combines both quantitative and qualitative methods to reply to our research questions. Sazu et al. (2022) point out that the benefit of using a multi method strategy is to "compensate for the weaknesses, and use the strengths, of the different methodologies" [12]. We selected an integrated ISM and Delphi fuzzy MICMAC approach, which helps us develop a structural model for an intricate problem in a created pattern. We created a hierarchical type of variables for effectively and systematically describing the trend underneath the research, instead of considering each adjustable separately [13]. Fuzzy MICMAC method and ism recognize the interdependencies between variables and highlight the impacts they might have on each other over the paths and loops. Within the last phase, we built fuzzy MICMAC models and ism through the use of experts' opinions [15]. The integrated research design of ours allows for alternating quantitative and qualitative approaches, generating a clear image of the intricacy of BDA implementation [27]. Additional elaborations of each research issue are presented in the next subsections.

3.1 Delphi Study

In the present paper, we utilized the Delphi technique to enjoy a summary of main enablers connected to BDA implementation and get to the consensus of panel participants about these enablers, in addition to their contextual interrelationships [23]. The Delphi analysis is a methodical analysis to get insights into the most crucial aspects of an intricate phenomenon [14]. The technique is useful to gather group judgments while staying away from unwanted effects associated with interpersonal biases, defensive attitudes, strong personalities, in addition to ineffective disagreements. Jahan et al. (2022) define an authority as "an person that has acquired expertise in big data steadily from a period of experience" and learning [26].

3.2 Interpretive Structural Modelling

As stated before, ISM as a rational mathematically derived strategy belongs to an intricate phenomenon comprising the interrelated variables by way of an organized progression according to the structural modeling of interconnected matrices [26]. The ISM strategy is interpretive, as it uses experts' judgment to establish the interrelationships between variables related to an intricate issue [29]. Among the benefits

of ISM methodology is that it allows the vague and inadequately articulated logical representation of devices into well-structured and visible versions.

4. Findings and results

In what follows, we go over the reasoning of the ISM procedure in much more information. The outcome of each step is completely described and illustrated by the relevant outputs of theirs.

4.1 Identifying the Variables

The ISM procedure initiates by determining the list of crucial parts of an intricate issue. As we mentioned previously, the list of important enablers was extracted and selected by literature review and Delphi technique. Reviewing prior job indicates twenty three main enablers that look like a summarized and synthesized type of factors that are important coming from pertinent case studies, taxonomy orientated research, as well as broader analysis on the basic effectively accomplishing BDA tasks [19]. Through Delphi review, specialists removed some BDAEs that were similar in meaning or perhaps a reduced amount of legitimate in the BFS context. Additionally, expert panels suggested four brand new items because of the importance of theirs in BFS firms [31]. Ultimately, our panelists selected nineteen key BDAEs as factors that are important for effectively applying BDA tasks. Table three summarizes the justifications of BDAEs choice [25].

4.2 Building the ISM Model

Establishing the structural model or digraph will be the last stage in the ISM methodology. Figure three, as a last ISM version, displays the representation of the BDAEs, as well as their interrelationships depending on the FRM, as well as level partitioning of the reachability matrix. The ISM model has 5 levels, the highest level comprises 4 enablers:

Embedding big data in business processes, appropriate organizational structures, justifiable and clear business case, big data analytics strategic positioning. This particular level contains the enablers with probably the highest ranking of dependency power, but reduced levels of getting energy. Therefore, they're relatively determined by the enablers in the lower levels.

4.3 Fuzzy MICMAC Analysis

Godet and Duperrin developed the MICMAC strategy to analyze the structure of complex systems. MICMAC examination visualizes the variables of a complicated system based on their dependence and driving power. MICMAC examination computes the driving and dependence energy of each process, adjustable by summing up across each vertical and horizontal axis. For binary MICMAC analysis, the amount of all 1s in the row offers the operating energy of that varying, while the sum of 1s in the column says its dependence power [21]. To boost the sensitivity and precision of the end result, we used fuzzy MICMAC analysis to think about not only the presence of all variables, but also the sturdiness of the relationships.

5. Discussion

This particular paper seeks to produce a strong design to determine the contributory enablers of big data implementation in the BFS sector. The ISM along with fuzzy MICMAC analysis specify and quantify interrelationships among nineteen BDAEs, which we identified and validated through literature review and Delphi learn. The structural item resulted from ISM visually highlights the prospective influences and dependencies of the enablers [23]. The digraph model and MICMAC analysis show that skilled and technical workforce, infrastructure readiness, financial support, and selecting proper major data technologies will be the main enablers and have the highest driving power in applying BDA tasks in the BFS firms [22]. This particular locating notes that the accessibility of the right energy is essential for great data tasks. Therefore, BFS firms should ensure that they have the option of necessary materials before initiating the BDA task. The literature has additionally underlined the links between great data project success and the presence of these main enablers. The study of ours extends this particular line of investigation by criticality linking these individual enablers and the joint potential influence of theirs inside the model. The BFS companies must procure essential technical, human and financial resources and successfully utilize these core enablers to get the productive results.

The additional main enablers, at the subsequent level in the digraph, are large data security, scalability, dependability, as well as large data customization ability. Managers, particularly in the financial industry, have excellent concerns regarding security issues and are concerned about the ethical and legal implications of gathering and unauthorized use of customers' information. Moreover, the nonfunctional capabilities of big data technologies, as well as the ability to alter the functions and analytical capabilities of its about the requirements of end-users, are important elements in big data tasks. The dependency of these BDAEs on the additional enablers in the lower level indicators, which BFS firms have used to use of specialized experts and possess additional assets to

control the necessary functions and tackle security issues.

Large data governance, creating a data driven society, good management support, and controlling dependency on legacy devices have top instability, therefore managers must be extremely cautious about them. This particular characteristic implies that when a huge information project has some issues with one or even much more of these enablers, due to their many connections, additional consequences may occur, as well as the entire project could be affected. Most fiscal service providers have invested countless dollars in their current systems, as well as infrastructures, and depend on them to carry out their critical and daily operations. So, managers are confronted with the task of changing and integrating these history methods with great data solutions, while considering massive investments now made in their infrastructure. Furthermore, healthful data driven society, successful major data governance, and support of best control have a positive impact on other enablers, as well as good comments on themselves.

Data integrity, empowering end users, embedding big data in business processes, proper organizational structures, justifiable and clear business situations, along with BDA strategic positioning, are at the top and upper-middle levels with higher dependency power. This finding suggests that the lower level elements can impact these enablers. BSF firms have to look into this result, so that success in every one of factors in top and upper-middle levels is primarily influenced by other interconnected factors.

6. Conclusion

6.1. Theoretical Contributions

By utilizing an exploratory integrated solution, this particular study seeks to improve the expertise of BDA enablers by analyzing the interrelationships and influences they've on one another. To create a legitimate and constant theoretical foundation, the study of ours identifies BDAEs and their contextualized interrelationships, which are crucial in real-world major details methods, especially in BFS context. The multi method strategy allowed us to improve our insight into the contextual interdependencies between BDAEs, as well as the impacts of theirs on the productive important details of project implementation.

6.2. Practical implications

The findings of the present study suggest that executing and running a huge data project is an intricate issue. Particularly, it depends on the firms' potential to simultaneously harness crucial resources and capabilities within a business context, which includes the information characteristics, and deploy these synergistically to clean the important information implementation process [20]. Additionally, the results of ours suggest that even though various enablers mentioned in this particular study are important in good implantation of BDA found BFS, the elements with increased driving powers provided at lower levels of Figure three plus impartial enablers in cluster IV of Figure four demand even more strategic focus. These elements with increased impact power or maybe as impartial enablers will acquire various other related elements that holistically predict the achievements of BDA in a banking or even monetary service business. Consequently, managers must ensure that their company is technically and financially prepared to step forward [28]. Much more particularly, our findings provide BFS managers with obvious strategic assistance, as well as the pathway to successfully use BDA. The structural model created in this particular study shows a far more realistic representation of the key enablers of big data tasks. The prioritized contributory BDAEs offer helpful empirical insights for practitioners and managers to notice the complete importance and structure of factors driving large data projects. The identified interdependencies and hierarchy of the BDAEs allow supervisors to learn a) key variables with good impact on some other components, b) very vulnerable aspects with higher dependence and operating power, that both groups need continued interest in the effective implementation of BDA tasks [18].

Moreover, the results pinpoint crucial aspects with good driving strength for big data tasks. Therefore, managers and practitioners must pay some attention to these key enablers [30]. Furthermore, the excessive dependency and driving energy of some BDAEs, including good management assistance, controlling dependency on legacy methods, signifies their unstable nature, and offers helpful instruction to managers when embarking upon their BDA transformational trip. Additionally, the prioritized contributory BDA enablers provide helpful proof for practitioners and managers to notice the complete importance and structure of elements driving BDA tasks. The identified hierarchy, as well as mutual associations of the BDAEs, can help supervisors learn a) key variables with good impact on some other components, b) very vulnerable aspects with higher dependence and operating power, that both groups need continued interest in the effective implementation of BDA tasks.

6.3. Limitations Directions for Future Research

Although this study enhances understanding of the key BDAEs and the relative significance of theirs, the results of this particular study must be interpreted in light of its limitations. For starters, present paper findings are based on the participation of twenty experts, and endure the subjective nature of experts' opinion, and might not be generalizable to various other contexts. Nevertheless, the wealthy data resulting from the Delphi study in conjunction with the Delphi study offer an initial starting place for future research. Next, this particular study was created and implemented based on the academics as well as Gurus judgment with expertise in the BFS sphere, while future studies can analyze ultimate users' viewpoints, outside stakeholders, particularly clients, as well as regulation bodies concerns and encounters. Third, the ensuing design hasn't been statistically validated, plus in the upcoming exploration Structural Equation Modelling may be used for this particular purpose

References

[1]. Alharthi, A., Krotov, V., & Bowman, M. (2017). Addressing barriers to big data. Business Horizons, 60(3), 285-292.

[2]. Arunachalam, D., Kumar, N., & Kawalek, J. P. (2018). Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice. Transportation Research Part E: Logistics and Transportation Review. 114, 416-436.

[3]. Bhosale, V. A., & Kant, R. (2016). An integrated ISM fuzzy MICMAC approach for modelling the supply chain knowledge flow enablers, International Journal of Production Research, 54(24), 7374-7399.

[4]. Brohi, S. N., Bamiah, M. A., & Brohi, M. N. (2016). Identifying and Analyzing the Transient and Permanent Barriers for Big Data. Journal of Engineering Science and Technology, 11(12), 1793- 1807.

[5]. Chen, L., & Nath, R. (2018). Business analytics maturity of firms: an examination of the relationships between managerial perception of IT, business analytics maturity and success. Information Systems Management. 35(1), 62-77.

[6]. Cherrafi, A., Elfezazi, S., Garza-Reyes, J. A., Benhida, K., & Mokhlis, A. (2017). Barriers in Green

[7]. Dwivedi, Y. K., Janssen, M., Slade, E. L., Rana, N. P., Weerakkody, V., Millard, J., ... & Snijders, D. (2017). Driving innovation through big open linked data (BOLD): Exploring antecedents using interpretive structural modelling. Information Systems Frontiers, 19(2), 197-212.

[8]. Gillon, K., Aral, S., Lin, C., Mithas, S., Zozulia, M. (2014). Business analytics: radical shift or incremental change? Communications of the Association for Information Systems. 34 (13), 287– 296.

[9]. Huang, C. K., Wang, T., & Huang, T. Y. (2020). Initial evidence on the impact of big data implementation on firm performance. Information Systems Frontiers, 22(2), 475-487.

[10]. Hung, J. L., He, W., & Shen, J. (2020). Big data analytics for supply chain relationship in banking, Industrial Marketing Management. 86, 144-153.

[11]. Isenberg, D. T., Sazu, M. H., & Jahan, S. A. (2022). How Banks Can Leverage Credit Risk Evaluation to Improve Financial Performance. CECCAR Business Review, 3(9), 62-72.

[12]. Jahan, S. A., & Sazu, M. H. (2022). Factors Affecting The Adoption Of Financial Technology Among The Banking Customers In Emerging Economies. Financial Studies, 39.

[13]. Janssen, M., van der Voort, H., & Wahyudi, A. (2017). Factors influencing big data decision-making quality. Journal of Business Research. 70, 338–345.

[14]. Lamba, K., & Singh, S. P. (2018). Modeling big data enablers for operations and supply chain management. The International Journal of Logistics Management. 29(2), 629–658.

[15]. Sazu, M. H., & Jahan, S. A. (2022). Impact of big data analytics on business performance. International Research Journal of Modernization in Engineering Technology and Science, 4(03), 367-378.

[16]. Mishra, N., Singh, A., Rana, N. P., & Dwivedi, Y. K., (2017). Interpretive structural modelling and fuzzy MICMAC approaches for customer centric beef supply chain: application of a big data technique, Production Planning & Control. 28(11-12), 945-963.

[17]. Sazu, M. H., & Akter Jahan, S. (2022). Impact of big data analytics on government organizations. Management & Datascience, 6(2).

[18]. Singarimbum, B., Dhial, A., & Farooqi, A. F. (2022). How Commercial Banks in Emerging Economies Can Leverage Big Data Analytics. International Journal of Data Science and Advanced Analytics (ISSN 2563-4429), 4(4), 94-97.

[19]. Cohen, M. C. (2018). Big data and service operations. Production and Operations Management. 27(9), 1709-1723.

[20]. Sazu, M. H. (2022). Does Big Data Drive Innovation In E-Commerce: A Global Perspective?. SEISENSE Business Review, 2(1), 55-66.

[21]. Lean implementation: A combined systematic literature review and interpretive structural modelling approach. Production Planning & Control. 28, 829-842.

[22]. Qureshi, M. N., D. Kumar, and Kumar, P. (2008). An integrated Model to Identify and Classify the Key Criteria and Their Role in the Assessment of 3PL Services Providers, Asia Pacific Journal of Marketing and Logistics. 20(2), 227–249.

[23]. Akter Jahan, S., & Sazu, M. H. (2022). Rise of mobile banking: a phoenix moment for the financial industry. Management & Datascience, 6(2).

[24]. Haddab, D. (2022). Data Science & Machine Learning Methods for Detecting Credit Card Fraud. International Journal of Data Science and Advanced Analytics (ISSN 2563-4429), 4(4), 71-75.

[25]. Davenport, T.H., Kudyba, S. (2016). Designing and developing analytics-based data products. MIT Sloan Management Review. 58 (1), 83–89.

[26]. Sazu, M. H. (2022). How Machine Learning Can Drive High Frequency Algorithmic Trading for Technology Stocks. International Journal of Data Science and Advanced Analytics (ISSN 2563-4429), 4(4), 84-93.

[27]. Shukla, M., & Mattar, L. (2019). Next generation smart sustainable auditing systems using Big Data Analytics: Understanding the interaction of critical barriers. Computers & Industrial Engineering. 128, 1015-1026.

[28]. Akter Jahan, S., & Sazu, M. H. (2022). Rise of mobile banking: a phoenix moment for the financial industry. Management & Datascience, 6(2).

[29]. Sun, S., Cegielski, C. G., Jia, L., & Hall, D. J. (2018). Understanding the factors affecting the organizational adoption of big data. Journal of Computer Information Systems. 58(3), 193-203.

[30]. Sazu, M. H., & Jahan, S. A. (2022). Impact of blockchain-enabled analytics as a tool to revolutionize the banking industry. Data Science in Finance and Economics, 2(3), 275-293.

[31]. Villacorta, P. J., Masegosa, A. D., Castellanos, D., & Lamata, M. T. (2014). A new fuzzy linguistic approach to qualitative Cross Impact Analysis. Applied Soft Computing. 24, 19–30.