**DATA WAREHOUSING - 5364**

**TERM PAPER**

Business Intelligence Research Proposal:

Impact of On-Campus Banks on Student Account Decisions

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**Abstract**

Modern data warehousing is becoming an integral part of contemporary organizations, representing a central location where structured, integrated, and historical data is stored. Nevertheless, it is the activity of analyzing and interpreting the data which can render the most benefits. This is where business intelligence comes into play.

BI refers to a range of analytical techniques, technologies, and practices that facilitate the transformation of data as raw material into information that generates value. Thus, when it is applied to data warehousing, BI allows researchers, students, and practitioners to find patterns, trends, and connections that would otherwise remain hidden in the overwhelming amount of information data warehousing represents.

This paper focuses on the case study of the utilization of BI in a higher education context to show a systematic investigation of how on-campus banking impacts students’ decision-making. The participants completed a survey containing questions about whether they are aware of the existence of on-campus banking facilities, whether they have used them to open an account, and what affected their decision.

Applying different BI techniques, from descriptive statistics and regression analysis to data representation through visualization, allowed obtaining insightful conclusions. This research is significant in two ways: academic and applied. Its academic value refers to existing research on the role of BI and data warehousing in the higher education field and students’ behavior. Its applied value is about how the findings can be used by educational institutions to enforce better financial services and, therefore, educational experience.

**Introduction**

In the contemporary world, business intelligence is an integral part and a rapidly developing area that helps organizations draw valuable insights from vast volumes of data. In the industry report, Gartner states that the size of the global business intelligence and analytics market is forecast to amount to $29.48 billion in 2025, increasing at a CAGR of 7.5% during 2020-2025[1]. This statistic shows the growing need for BI that can facilitate data-driven strategic decisions.

At the core of a BI infrastructure, there is a data warehouse – a systematic approach that involves integrating data from multiple specialty systems into one comprehensive database helping businesses run complex analytical tools extracting patterns, trends, or relationships, which are otherwise difficult and time-consuming to derive from many independent data sources [2].

Business Intelligence (BI) systems combine data warehousing, data integration (ETL), and data quality management to consolidate and clean data from various sources. They utilize data analytics, OLAP, and advanced analytics to analyze data, enabling deep insights and decision-making. Reporting, visualization tools, and dashboards then present this data clearly, aiding in performance management and strategic planning.

This research paper uses a BI approach within a data warehousing framework to study the effect of campus-based banks on students’ decision-making when it comes to their financial matters. The presence of a bank branch on campus has a significant impact on students’ choice to open or maintain a bank account, which in turn has a substantial impact on their overall financial health and engagement [3].

As a result, this paper uses a robust on-campus bank database obtained through a combination of research methodologies, which include: a survey of students that will yield primary data on:

a) Students’ current understanding of and interactions with campus banks.

b) The determining factors on whether to open or not open an account with the campus-based bank.

c) The correlation between the proximity of a bank to a university and the likelihood of students opening an account with this bank.

The purpose of the study is twofold. First, in the academic arena, it adds to the knowledge base on the topic, offering extensive insights into intersections between business intelligence, data warehousing, and higher education student behavior. Second and most importantly, the findings presented may be operationalized and practically utilized by universities seeking to make their financial operations more efficient and improve the overall student experience.

**Background**

Over the last two decades, the notion of business intelligence has demonstrated substantial development and improvement owing to the promotion of data management, analytics, and visualization technologies. Shollo and Galliers suggest a definition of BI in their 2017 article for the Journal of Business Research as a “set of decision-support technologies that are utilized for the collection, the pulling together and integration, the analysis, and the dissemination of data” [4]. It implies that BI includes different tools and approaches that allow organizations to turn diverse datasets into practical insights.

BI’s roots trace to previous work in management information systems, and executive information systems and had been laid. As the power of computing grew and the cost of data storage fell, more organizations began to recognize the value of pushing big data through their pipeline to support strategic decision-making processes [5]. From this understanding, data warehousing became a must-have component of BI architecture.

Data warehousing, as described in a 2019 article in the Communications of the ACM, is "a system used for reporting and data analysis and is considered a core component of business intelligence infrastructure" [6]. Data warehouses ensure the integration of disparate data sources into a single subject-driven store. This functionality ensures the viability of data-driven analysis and reporting, promoting the provision of a correlated view of an organization’s information resources.

The linkage of business intelligence and data warehousing has advanced over the years due to pressure for more powerful processing of data and more evolved analytics. As data volumes grew exponentially, organizations sought more sophisticated tools and techniques to extract meaningful insights from their data [7]. To this end, BI technologies such as OLAP, mining and predictive analytics were more frequently employed within data warehousing settings to help decision-making personnel at all levels.

Several topics have been covered in existing literature at the intersection of BI and data warehousing. They include, among others:

a) Architectural frameworks developed for more integrated BI-data warehousing solutions [8]

b) Techniques used to better design data warehouses that more holistically support BI applications [9]

c) Relationship between BI and data development and organizational performance [10]

d) Recent developments in BI and their integration with data warehousing [11]

e) Case studies and other prima facie data on successful BI-data warehousing initiatives that can guide future action and further research.[12]

As this body of knowledge grows, there are at least two strategic implications: first, organizations must re-strategize how they will combine BI and data warehousing to realize the full potential of their data assets. Specifically, utilizing BI tools and techniques in a proper data warehousing setup allows a business to undertake advanced analysis, make proper decisions, and position itself distinctively in the competitive field.

**Methodology and Tools Used in the Research Study**

In our research study, we utilized a variety of tools to effectively collect, prepare, and analyze data from our target audience or sample population. Here is a breakdown of the methodology and tools employed:

**Qualtrics**: This online survey platform was essential in gathering data. It offered a user-friendly interface that allowed us to design and distribute surveys efficiently, thus enabling us to collect the necessary data from our participants.

**Microsoft Excel**: We used Excel for data transformation and preparation. After exporting the survey responses from Qualtrics, Excel's robust data manipulation capabilities were instrumental in cleaning, filtering, and transforming the raw data into a structured format suitable for further analysis.

**Python:** For the analysis phase, we employed the Python programming language. Python's data analysis libraries, such as Pandas, NumPy, and Matplotlib, were crucial. We conducted descriptive data analysis, performed statistical calculations, generated summary statistics, and created visualizations. These charts and graphs facilitated a better understanding and communication of the patterns and insights derived from the survey data.

**Insights**

**Insight 01**: The initial analysis of our survey as pictured in Figure 1.1 (refer Appendix- I) data reveals that most respondents are U.S. citizens, compared to non-citizens. Notably, within the U.S. citizen group, there is a significant predominance of students.

**Insight 02**: The bar chart in Figure 1.2 (refer Appendix- I) depicts a survey analysis concerning the presence of banks on campus and the subsequent account openings by respondents. A significant 66% of respondents confirmed the presence of a bank on their campus, whereas only 20.5% have opened an account. Contrastingly, a notable proportion (69.2%) of those without a bank on their campus have still initiated an account elsewhere. This indicates a substantial discrepancy between the availability of on-campus banking services and the actual utilization by the student population. Additionally, a small fraction of respondents is not aware of their campus's banking status, yet a comparable percentage have and have not opened accounts, suggesting a lack of information may affect students' banking decisions.

**Insight 03**: The histogram in Figure 1.3 (refer Appendix- I) provides insights into the factors influencing students' banking choices on campus. The predominant factor, as indicated by its significance in the 'Very Influential' category, is the pre-existence of a bank account with another bank. Meanwhile, the lack of awareness about on-campus banking facilities also appears to be a major deterrent, pointing to a possible gap in communication. Additionally, the limited benefits or promotions from on-campus banks, when compared to others, are moderately influential in decision-making, indicating that better offers could potentially attract more students. These findings could be instrumental for on-campus banks in strategizing to enhance their visibility and value proposition to increase student engagement.

**Insight 04**: The pie chart in Figure 1.4 (refer Appendix- I) assesses the likelihood of respondents to open a bank account if exclusive benefits were availed. A large percentage, 42.1%, being ‘somewhat likely’ reveals the high interest that such exclusive benefits could stimulate, but also insinuates room for similar initiatives. Interestingly, 19.6% and 27.8% are the proportions of ‘neither likely nor unlikely’ and ‘extremely likely’ responses. Therefore, it implies that offering exclusive benefits isn’t everyone’s priority, a factor the banks could leverage to tailor their packages better. Therefore, it indicates the provision of carefully designed and beneficial packages could target most of these customers to opt for campus banking.

**Insight 05**: As it is observable from the bar graph in Figure 1.5 (refer Appendix- I) ‘Location’ is a very likely factor influencing respondents’ decision to open an account on campus. Factors like ‘Student benefits offered’ also weigh heavily among respondents’ likelihood of considering the same. ‘Fees’ and ‘Reputation and reliability of the bank’ are somewhat likely to influence the respondents above the halfway point. The important convenience and benefits tailored for students are in the on-campus banking setup.

**Insight 06**: The satisfaction levels of respondents as pictured in Figure 1.6 (refer Appendix - I) with the on-campus banking experience can be seen in the horizontal bar chart. Most people seem to be satisfied, with “somewhat satisfied” being the most prominent category while the second-largest category is “extremely satisfied”. A moderate number of respondents take a “neutral” stance, which the banks could leverage to improve the experience and move more people to the satisfied category. Such feedback could be vital for banks operating on campus in identifying the satisfaction rate and areas where they can improve the most.

**Findings**

After conducting a comprehensive survey and applying rigorous business intelligence techniques, our research revealed several key insights into the impact of on-campus banking facilities on students’ financial decision-making processes.

1) **Inertia in Account Opening**: As noticed, around 69% of participants had not opened an account with the on-campus bank. It indicates that they were already capitalizing on financial services provided by other banking institutions. Therefore, it is difficult to convince students to switch to using on-campus banking services due to their existing relationships and preferences.

2) **Untapped Potential:** Despite the high percentage of students not currently utilizing the on-campus bank, our data showed that around 70% of respondents expressed interest in opening an account if the bank offered exclusive benefits tailored to their needs as students. This finding underscores the untapped potential for the on-campus bank to attract a larger student customer base.

3) **Influence of Convenience:** Another important insight was that the convenience of having a bank’s fireplace influences a significant part of the student body when selecting a bank. Therefore, it can be concluded that placing ATMs, branches, and other touchpoints where it is convenient for students can directly influence their decisions to open an account.

4) **Satisfaction with On-Campus Banking**: Over 50% of the students who opened their accounts with the on-campus bank were satisfied or extremely satisfied with their banking at large. Thus, it can be considered to continue working on the improvement and promotion of the on-campus banking services among the greater student amounts.

**Proposed Solutions**

Based on the above findings, we propose the following strategies and solutions to optimize the on-campus banking experience and promote student engagement:

1. **Tailor Marketing and Operational Strategies**: Use the gathered details about students’ preferences and pain points to create marketing campaigns and operational strategies. The bank may also develop student accounts that include specially waived fees or other privileges that persuade students to open such accounts.

2. **Enhance Awareness and Visibility**: Implement an outreach and awareness effort to inform students about both the existence of on-campus banking and the options and benefits. This may include promotional efforts across campus, informational brochures, and financial workshops.

3. **Increase Targeted Benefits and Competitive Offers**: Monitor the developments in the local banking competitive landscape and customize the benefits and promotions provided by the on-campus bank in ways that will make them more attractive to students. In doing so, the bank can become the students’ preferred choice for financial services.

The proposed solutions, aligned with the insights driven by the BI, aspire to improve the overall on-campus banking experience, foster student engagement, and facilitate the financial well-being and success of the student population in general.

**Merits**

**Practical Insights:** This study’s practical value lies in insights into the students’ financial patterns and preferences that can guide universities and on-campus banks in refining their work.

**Strategic Recommendations:** The research provides strategic recommendations for enhancing on-campus banking facilities and promoting student engagement, potentially leading to improved financial well-being for students.

**Academic Contributions:** The study contributes to the academic literature on the intersection of business intelligence (BI), data warehousing, and student behavior in higher education, adding to the body of knowledge in this area.

**Data-Driven Decision-Making:** By leveraging BI techniques, the present study promotes data-driven decision-making in terms of choosing on-campus banking services and associated policies.

**Identifying Untapped Opportunities:** The research showed that the current banks in the university area could attract more student clients based on the promotions and benefits they provide.

**Limitations and Challenges of Study**

**Survey Limitations:** The study based on surveys can come with certain limitations. The size of the sample may now always represent the overall population; if so, generalizing the findings will be challenging.

**Complexity of Influencing Factors:** The actual factors influencing the decisions made by students regarding their finances can be beyond the scope of this study. Students’ decisions can be affected by such factors as family and parental backgrounds, current financial statuses, and prior relationships with banking institutions themselves.

**Rapid Changes in Technology:** The development of new technologies and the improvement of those already available to conduct banking or other transactions will continue to increase, rendering the data collected during this study quickly outdated.

**Conclusion**

The incorporation of business intelligence methodologies with data warehousing played a vital role in enhancing our research program’s analytical capacity. The combined approach allowed us to obtain ingenuous elucidations to the research question concerning the influence of on-campus banking amenities on students’ financial decisions. By conducting an exhaustive survey and utilizing business intelligence using descriptive statistics, regression analysis, and data visualization, we have found pioneering discoveries that are crucial for key decision-makers in the education sector.

Some of the most substantial findings include students’ account opening inertia, the existing room for growth in on-campus banking services, the prominent role of convenience in student bank selection, and the overall satisfaction with the existing on-campus banking system. The cumulative impact of these insights forms the basis for the personalization of strategies for university administrations in terms of optimizing their on-campus banking ecosystem and contributing to developing a generation with better financial well-being. To tackle the identified challenges and capitalize on revealed opportunities, a range of strategic solutions are proposed, including personalized marketing and operational strategies, raising awareness for on-campus banking services, and offering thoughtful and enhanced benefits and attractive deals. By implementing these approaches, educational institutions can make on-campus banking a more valuable and convenient service for students which, in turn, will drive activity among them.

Looking into the future, the avenue for additional research is the use of advanced BI tools, such as predictive analytics. This company can further improve the immersion of data warehousing programs by predicting the needs of students. Thus, it can address financial literacy issues prospectively and create customized approaches to enhance the overall financial health of students. In summary, this research project has established the profound change that results from integrating BI with data warehousing. Further use of the wealth of data existing within the campus domain and analyzing it with more sophisticated tools can shape decisions by educational institutions to become more informed and support students in ways that are beneficial in the short and long term.

**References**

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**APPENDIX- I**

Charts and graphs

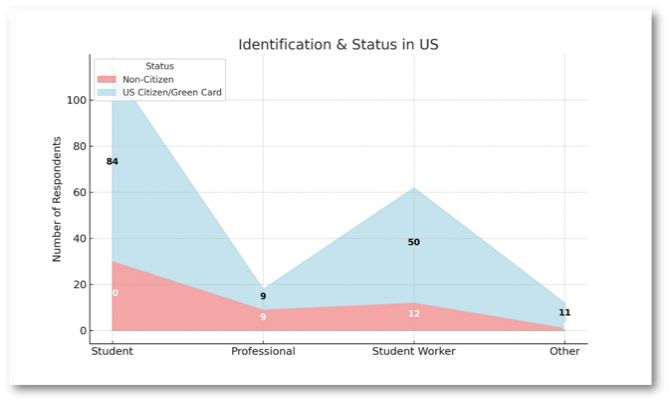


Figure 1.1

A graph showing a number of blue and green bars

Description automatically generated

Figure 1.2

A graph with different colored bars

Description automatically generated

Figure 1.3

A pie chart with text on it

Description automatically generated

Figure 1.4

**A graph with different colored lines

Description automatically generated**

Figure 1.5

A screenshot of a computer

Description automatically generated

Figure 1.6

**APPENDIX- II**

Questionnaire for On-Campus Banking Services Survey

Q1. You identify yourself as?

* Student
* Professional
* Student Worker
* other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q2. What is your current status in the United States?

* US Citizen/ Green Card
* Working Professional (H1B, L1)
* Student (F1, J1)
* Dependent visa (H4, F2, J2)
* other (5) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Q3. Did you have a bank account (checking/savings) in the United States before attending the University?

* Yes (1)
* No (2)

Q4. Is there a bank on your campus?

* Yes
* No
* Not aware

Q5. Have you opened an account at the bank-on-campus?

* Yes
* No
* Plan to open in future!

Skip To: 8 If have you opened an account at the bank-on-campus? = Yes

Q6. Please indicate the degree to which any of the following factors influenced your decision NOT to open an account with the bank-on-campus.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Very influential (1) | Moderately influential (2) | Slightly influential (3) | Not influential (4) |
| Already have a bank account with another bank (1) |  |  |  |  |
| Lack of awareness about the bank-on-campus (2) |  |  |  |  |
| Limited benefits/ promotions offered compared to another bank (3) |  |  |  |  |
| Other please specify (4) |  |  |  |  |

Q7. Would you consider opening a bank account in the bank-on-campus if it offers exclusive student benefits?

* Extremely likely
* Somewhat likely
* Neither likely nor unlikely
* Somewhat unlikely
* Extremely unlikely

Skip To: End of Survey If Would you consider opening a bank account in the bank-on-campus if it offers exclusive student be... = Extremely likely

Skip To: End of Survey If Would you consider opening a bank account in the bank-on-campus if it offers exclusive student be... = Somewhat likely

Skip To: End of Survey If Would you consider opening a bank account in the bank-on-campus if it offers exclusive student be... = Neither likely nor unlikel

Q8. How long have you been banking with the bank-on-campus?

* Less than 6 months
* 6 months to 1 year
* 1-3 years
* More than 3 years

Q9. Please indicate the degree to which any of the following factors influenced your decision to open an account with the bank-on-campus.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Extremely likely (1) | Somewhat likely (2) | Neither likely nor unlikely (3) | Somewhat unlikely (4) | Extremely unlikely (5) |
| Location (1) |  |  |  |  |  |
| Fees (2) |  |  |  |  |  |
| Student benefits offered (3) |  |  |  |  |  |
| Reputation and reliability of the bank (4) |  |  |  |  |  |
| Others, please specify (5) |  |  |  |  |  |

Q10. How frequently do you physically use the bank-on-campus services (excluding ATM services)?

* 1-2 times a week
* 1-2 times a month
* 1-2 times a year
* Never

Q11. Based on how often you use the following on campus banking services, please rate them.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Extremely likely (1) | Somewhat likely (2) | Neither likely nor unlikely (3) | Somewhat unlikely (4) | Extremely unlikely (5) |
| ATM (1) |  |  |  |  |  |
| Checking/Savings account (2) |  |  |  |  |  |
| Loans (3) |  |  |  |  |  |
| Credit/Debit Card (4) |  |  |  |  |  |
| Others, please specify (5) |  |  |  |  |  |

Q12. When selecting a particular bank, how much does the convenience of having a bank-on-campus affect your decision?

* Extremely important
* Very important
* Moderately important
* Slightly important
* Not at all important

Q13. How satisfied are you with the on-campus banking experience?

* Extremely satisfied
* Somewhat satisfied
* Neutral
* Somewhat dissatisfied
* Extremely dissatisfied

End of Block: On campus Banking Survey