

The Evolving Global Enterprise: Preparing Future Accountants Using Analytics and Systems Integration

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ABSTRACT

The emergence of big data has created demand in the job market for enhanced visualization skills used to interpret mass amounts of information. The immense scale of modern business imposes several implications on decision makers, considering that modern information can be comprehensive and overwhelming. Hence, today's data sets must be presented with the use of visualization tools, so that decision makers can more easily analyze and interpret a business' overall performance. To meet this growing demand, educators are beginning to redirect their coursework to increase the use of analytic software in the classroom environment. This paper will further explore development of capstone courses, in which accounting can be taught through the use of analytics and ERP products.

Keywords: Accounting, Big Data, ERP Integration, Data Visualization, Analytics

INTRODUCTION

Over the past twenty years, the accounting profession has been confronted with convincing arguments that technology changes must occur in the accounting classroom. It behooves the accounting educator to assist students who will be entry level employees to embrace new technological skills that run the range from spreadsheet accounting to advanced predictive analytics. The sense of much of the literature is that this is not being done. To live and work in the digital age, one must embrace its tools, and such tools should be made an integral part of the classroom and learning experience.

As the accounting profession changes, it would be unreasonable to allow university accounting curricula to remain static. The ever-changing field of accounting should be reflected in a classroom environment, where teaching objectives mirror the demands of the corporate world. One of the most pressing aspects of this demand is the emergence of big data. This case study could be integrated within the finance or accounting curriculum at the intermediate level to show how business analytics can support and enhance the decision-making process. Whereas existing literature focuses on the need to include data analytics in the accounting and finance curriculum, this case study provides a real-world method to incorporate such principles in the classroom.

LITERATURE REVIEW

An overview of literature highlights several problems in the connectedness between accounting education and the professional positions that students seek. Siegel and Sorenson (1994, 1999, 2002) and Siegel and Kulesza (1996) allude to the fact that accounting education has not kept up with the technology innovations and challenges facing the industry. Groyberg et. al (2011) found the need for a broader set of skills given the changing expectation and demands for accountants in strategy formulation, analysis, and interpretation of large datasets affecting many constituent users.

According to a survey performed by Brown and Sikes (2012) of McKinsey Global Incorporated, one key objective of corporate executives is to leverage the power of big data to gain a competitive advantage in their respective industries. Effective accounting education should address these concerns, in order to adequately prepare students for real-world, data-intensive challenges. Although big data is a commonly mentioned term in today's business world, it can be an unclear and nebulous term with great potential for misunderstanding. Large datasets (big data) result from the compilation of mass amounts of aggregated, unstructured information that need agents to give it substance through organization and analysis. Moreover, big data is not necessarily comprised of numbers alone, but also includes strings of text, keywords, identifiers, and characteristics pertinent to specific transactions. With the right data visualization tools, big data analytics can lead to the discovery of more significant, integrative performance results than a simple survey or study.

Big data, when cleansed and formatted appropriately using relational database tools, has the potential to transform an organization's strategic decision-making processes. The proper structuring and formatting of data is the key to effective analysis, as it is necessary to create dimensions and measures that can be compared (Sherman, 2014). Datasets can include tens of thousands of rows of data, and a row-by-row evaluation is simply inefficient and ineffective. In an effort to simplify big data, visual analytics have become the benchmark method for interpreting large-scale findings for an end-user.

Powerful analytic applications are being developed and refined in order to make use of the seemingly endless amount of data collected on a global scale in the modern business environment. Analytics has proven to be tremendously valuable in a variety of applications across several industries, and its significance for accountants is becoming readily apparent. For example, by harnessing the power of analytics, auditors have developed the ability to test comprehensive sets of data, rather than being merely limited to samples (Murphy & Tysiac, 2015).

According to research conducted by Bauer (2017), “the data analytics process of today's businesses involves at least two primary challenges: (1) collecting and categorizing voluminous data and (2) analyzing and prioritizing relevant data”. The first challenge that Bauer addresses can be solved using ERP systems, which can automatically generate reports in easily customizable formats. Meanwhile, analytic visualization products, such as SAP Lumira, prove useful in addressing the second challenge he proposes. SAP Lumira enables the discovery of underlying trends in organizations’ financial datasets, creating redefined roles for accountants. Accountants have become key figures in the executive management of corporations, as they possess strategic insight and analytical skills necessary to envision and fulfill long-term objectives (Gamage, 2016). No longer are accountants confined to journal entries in the ledger, but instead, they use their expertise to interpret information in ways that traditional data analysts cannot.

Accountants in the workplace are adapting their skillsets in order to meet the modern demand for analytical abilities within the growing and ever-demanding framework of technology. Thus, it is necessary for accounting education to sense these demands and respond appropriately. There are clear shortfalls in many accounting curricula in terms of this integration and there is no time for any further delay in incorporating modern technologies (Pan & Seow, 2016). The most effective way for accounting education to implement these technologies is to incorporate elements of data analytics and information systems with a focus on real-world business application into most courses in the curriculum, not only one introductory course (Pan & Seow, 2016). The following case study provides an efficient way to integrate analytics into the classroom.

INTEGRATED CAPSTONE PROJECT

The primary goal of this capstone project is to demonstrate how Enterprise-Resource Planning (ERP) software can be used to effectively supplement teaching real-world analytic applications in the classroom environment. This case was developed at a US-based liberal arts institution with a strong tradition of incorporating integrative learning and communication skills throughout the curriculum. In developing this case, we were able to create advanced practice sets focusing on accounting concepts and applications using ERP. These ERP applications are used throughout the accounting curriculum in four of six required courses.

This case-based analysis, as featured within this paper, is a practice set used to teach third-level (junior) accounting students. The university is partnered with the SAP University Alliance program. SAP is one of the leading ERP providers, and SAP Lumira is their data visualization product. By partnering with the alliance, the university is granted access to proprietary platforms such as SAP ECC 6.0 and SAP Lumira.

SAP technology and software was incorporated within three of the six major accounting courses at the institution through the use of practitioners and consultants in the classroom to

enhance students' comprehension of practical applications. Recently, the faculty have begun to incorporate applications of data analytics to enhance the reporting features of SAP databases.

Students do not merely absorb the information in these courses, but they participate in the pedagogy as collaborators in the learning process. A group of students are chosen as STAR Leaders through a highly selective application process. STAR Leaders are undergraduate accounting majors who have exhibited a high degree of knowledge in their academic coursework and have demonstrated proficiency in the use of modern technology tools. These students are paid technology assistants who are particularly trained in data visualization and data analytics and contribute to the development and implementation of SAP materials in the classroom. They are provided with enrichment activities to assist them in understanding the essentiality of implementation of big data applications. They also assist in developing and testing different analytic applications, as well as overseeing classroom delivery and further supporting the course through an analytics help desk. The products and materials that are developed by the STAR Leaders, such as the materials in this case study, are incorporated into the accounting curriculum and presented to all students in intermediate accounting classes.

THE CASE OBJECTIVES

1. Consider the link between analytics and big data sources to identify key performance markers.
2. Formulate an analytics dashboard evaluating financial performance around several key indicators.
3. Create an interactive dashboard menu for an interactive presentation with end-users.
4. Submit written evaluative analysis along with a detailed report in an e-mail to responsible parties.

THE CASE SCENARIO

Global Bike Incorporated (GBI) is a fictional, world class bicycle company serving the professional and prosumer cyclists markets for touring and off-road bike racing. GBI's riders demand the highest quality and performance from their bikes and accessories. GBI is involved in both wholesale and direct selling of its major product categories: bicycles and accessories. They are a growing company that is attempting to expand internationally. They have identified STARApollo as a target company that would fit their strategic growth initiatives.

SAP Reporting and Analytics – STARApollo Overview

STARApollo is a fictional, private company that manufactures outdoor apparel. The company was started in Texas and made a market by offering high quality footwear, sporting gear and heavy-duty baggage. In recent years, the company has grown through expanding its product mix to include apparel targeted towards surfers, snowboarders, cyclists, skiers and others. They are a large international company, operating in over 15 different countries and offering merchandise in 12 different product lines. STARApollo along with its subsidiaries, has a large customer list, and generates high annual revenues compared to its competition. GBI is looking to acquire STARApollo, in order to take advantage of their product lines, retail locations, international outlets, and supply chain.

GBI needs you to serve as a consultant to assess the overall performance of STARApollo, and identify key performance indicators that will help the CEO determine if the company is a valuable acquisition target.

The student will follow the steps of the STARApollo script to build an interactive analytical dashboard, as outlined in Appendix A. Appendix B includes the summative reports and data visualizations created by the student. Appendix C showcases the written analysis and interpretation of the data, leading to a professional judgment as to whether the acquisition is feasible.

SUMMARY AND EVALUATIVE COMMENTS

The STARApollo Case and SAP Lumira enable accounting students to easily and efficiently identify trends that are indicative of financial success in extensive datasets, that might otherwise be difficult to interpret. In using analytics, university accounting students have become able to test different accounting dimensions and relationships through the use of interactive, pictorial dashboards. The dashboard allows students to prepare data visualizations, accompanied by a written analysis, that serves as a proposal to show the growth dimensions of the targeted company for takeover. This capstone project inextricably combines a student's prior knowledge of accounting with the analytical capacity of SAP Lumira and the professional judgment needed to develop a substantive executive report. Student learning is enhanced within a course where they feel they are exposed to real-world experiences that will be useful in their future jobs.

Students' projects are evaluated based on several key metrics, which include Proficiency and Skill, Methodology, and Assessment of Learning. The respective attributes for each criterion are defined in Appendix D.

The first iteration of this project produced very favorable evaluation. Several student comments reflected how real the project felt, and thus created a stronger motivation to dig deeper into the financial analysis. Others suggested that the case encouraged them to consider a dual major in other disciplines, such as Finance and Business Intelligence.

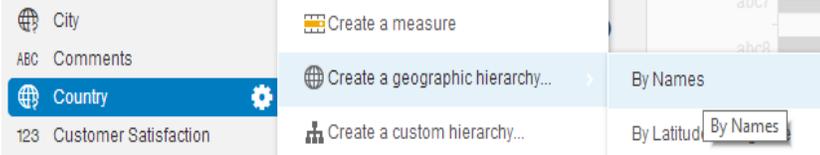
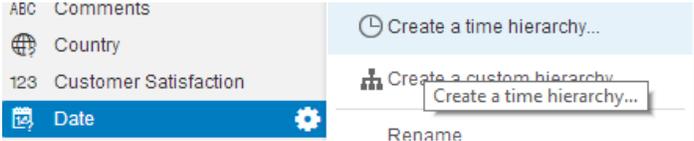
This is only the beginning. Future plans call for integration of this project with capstone courses of other majors such as finance and within co-operation with other schools. This project could be adapted and combined with other courses and other cases. Testing in the future will also occur at the graduate level.

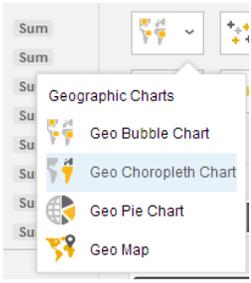
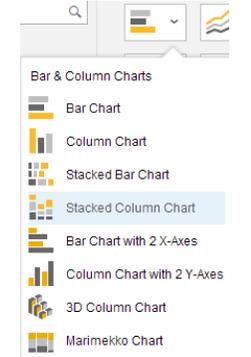
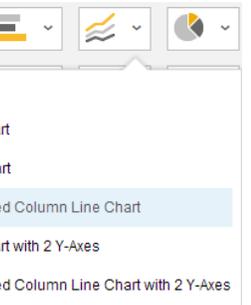
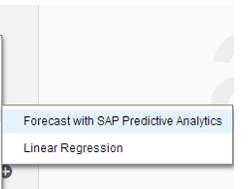
From a technology perspective, S/4HANA, with its embedded analytics, offers great opportunity to increase student insight into integrated software. There is also some real potential in extending the classroom with accounting applications in additional specialties such as GRC (Governance, Risk and Compliance) and BPC (Business Planning and Consolidation).

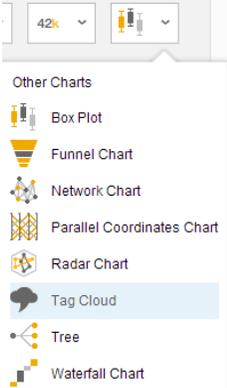
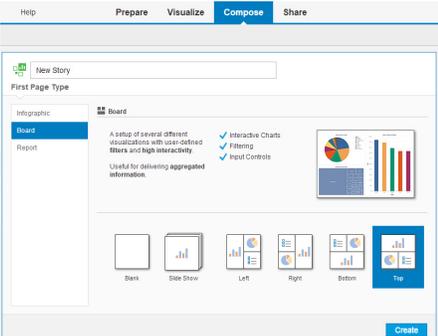
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APPENDIX A: STARApollo Case

<p>Excel Download</p>	<p>Access the Excel Database in the Student Site.</p> <p>In the Student Site, download the STARApollo Data Excel file found under Course Documents</p>
<p>SAP Lumira File</p>	<p>Launch SAP Lumira</p> <ol style="list-style-type: none"> 1. On your desktop, locate the SAP Lumira Application and double click on it 2. Once opened, you may be prompted to enter a keycode. If so, we will provide one for you 3. In the top left of the screen, select File → New 4. Under Add New Dataset, double click on Microsoft Excel, and select the Excel File you had previously downloaded from the Student Site 5. Once all of the columns and rows have been uploaded, select Create 
<p>Create a Geographic Hierarchy</p>	<p>You will specify the Geography Dimension of SAP Lumira</p> <ol style="list-style-type: none"> 1. On the left side of the screen, under Dimensions, hover over Country and select Options → Create a Geographic Hierarchy → By Names 2. Under Geographical Data, select the dropdown option next to City, and select City. Hit Confirm 3. A screen will appear stating all of the locations the application was able to find. Press “Done.” 4. When completed, a new dimension will be created called Geography_Country_City, and will include 4 sub-dimensions. 
<p>Create a Date Hierarchy</p>	<p>You will specify the Date Dimension of SAP Lumira</p> <ol style="list-style-type: none"> 1. On the left side of the screen, under Dimensions, hover over Date and select Options -> Create a Time Hierarchy 2. Once Completed, a new dimension will be created called Time_Date, and will include 4 sub-dimensions. 

<p>Visualization #1 Geochloropleth Chart</p>	<p>You will compare annual revenues by geographical location. **Use a Geochloropleth Chart (Under Geographic Charts)**</p> <ol style="list-style-type: none"> Report the following measures - Sales Revenue Under the geographic hierarchy you created, add Country to dimensions 	
<p>Visualization #2 Stacked Column Chart</p>	<p>You will compare revenues and gross margin by fiscal year. **Use a stacked column chart (Under Bar and Column Charts)**</p> <ol style="list-style-type: none"> Report the sales figures by adding the following labels to measures - Gross Margin - Sales Revenue Under the date hierarchy you created, add Quarter to dimensions 	
<p>Visualization #3 Combined Column Line Chart</p>	<p>You will compare revenues and profits by product lines **Use a combined column line chart (Under Line Charts)**</p> <ol style="list-style-type: none"> Report the following measures - Sales Revenue - Gross Margin Add Product Lines to dimensions 	
<p>Visualization #4 Predictive Line Chart</p>	<p>You will forecast and compare annual revenues by fiscal year. **Use a line chart (Under Line Charts)**</p> <ol style="list-style-type: none"> Report the revenues by adding the labels to measures - Sales Revenue Under the date hierarchy you created, add Quarter to dimensions <ul style="list-style-type: none"> - Hover over Sales Revenue once you add it, and select Settings, then Predictive Calculation, Forecast with SAP Predictive Analytics - Once the window opens, select Triple Exponential Smoothing, and enter 8 quarters to predict - Once this is finished, select settings on Sales Revenue again, and repeat this process for Linear Regression under the Predictive Analytics field 	

<p>Visualization #5 Tag Cloud</p>	<p>You compare revenues and quantity sold by regions **Use a Tag Cloud Chart (Under Other Charts)**</p> <ol style="list-style-type: none"> Report the revenues and quantity sold by adding the following labels to measures <ul style="list-style-type: none"> - Under Word Weight, add Sales Revenue - Under Word Color, add Quantity Sold Under the geographic hierarchy you created, add Country to dimensions under Word 
<p>Create a Dashboard</p>	<p>Navigate to the “Compose” tab on the top of the screen and select the “Board Option”</p> <p>Select the “Top” option</p> <p>**Hit Create**</p> <ol style="list-style-type: none"> Using the visualizations you created, you will choose 3 to report to the CEO Click and drag the first chart to the top designated area. Click and drag the corresponding two charts to the bottom designated areas. Rename the Dashboard: “STARApollo Big Data Analytics” –[INSERT PARTNER INITIALS] 
<p>E-mail</p>	<ol style="list-style-type: none"> Using the snipping tool, take a snippet of the STARApollo Analytics Dashboard. Once the Dashboard has been snipped, save the image to your Desktop Send a copy of the Analytics dashboard to your partner (if applicable). gbxus-XX <p>Requirement: Send a copy of the Analytics dashboard to the CEO, and complete a written analysis on the following:</p> <ol style="list-style-type: none"> What is the value of data analytics? How could the following dashboard help the executives make decisions? Evaluate each of the visualizations that you chose to report, individually. In a couple of sentences for each visualization, explain any significant numbers, facts, trends, or relationships that you believe exist. Based on the visualizations you created, do you believe GBI should attempt to consolidate with STARApollo? What possible positives/negatives would be associated with this merger? <p>Send this e-mail to the CEO through SAP Business Workplace by following the steps below.</p>

APPENDIX B: DASHBOARD VISUALIZATIONS

B1. Geochloropleth Chart

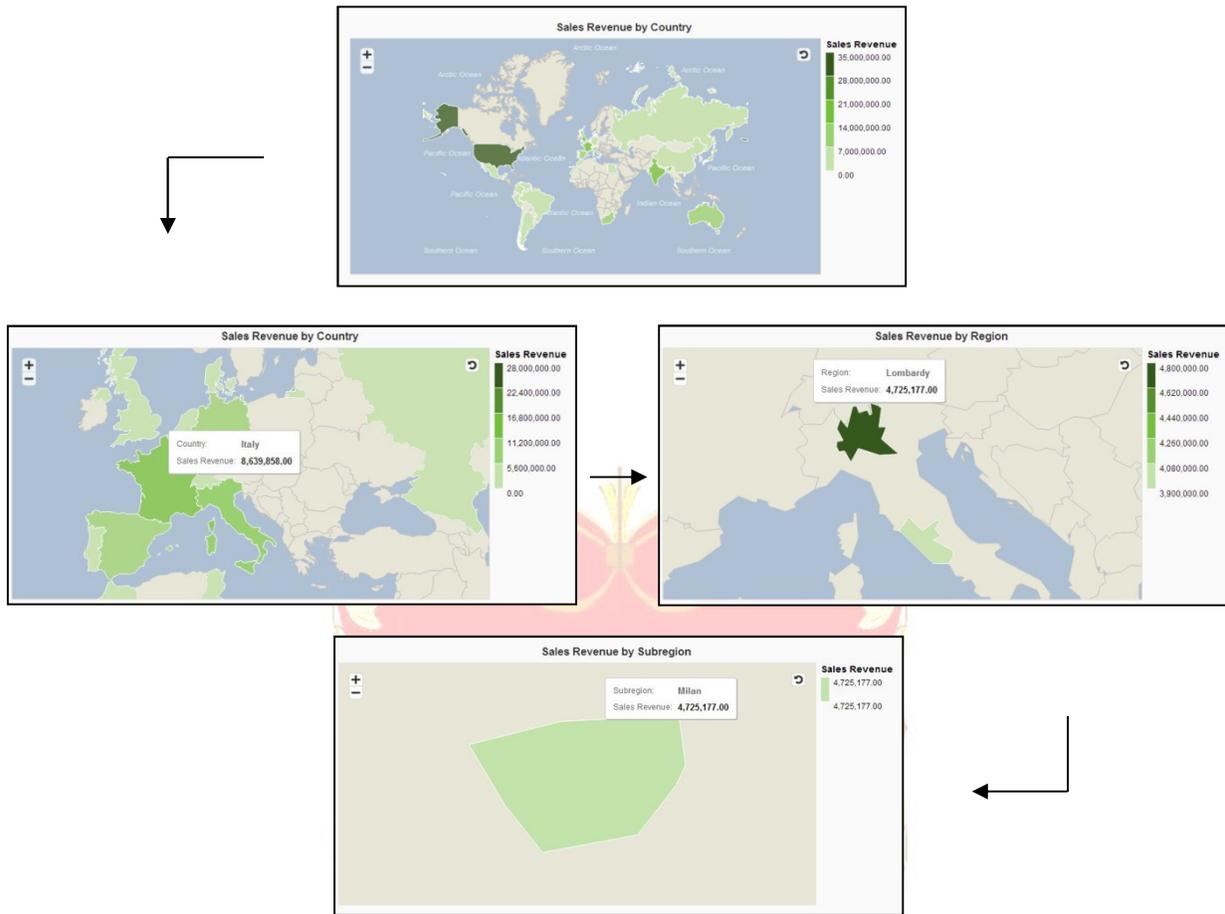


Chart Category	Explanation	Examples
<p style="text-align: center;">Geographic</p>	<p>Used to show or determine whether relationships exist between defined measures and geographic location. Geographic charts allow for flexible analysis, where users can filter data based on segmented states, regions, or countries.</p>	<ul style="list-style-type: none"> • Geochloropleth Chart • Geobubble Chart • Geopie Chart

B2. Stacked Column Chart



Chart Category	Explanation	Examples
Comparison	Used to determine whether relationships exist between two or more objects. Comparisons are effective for calculating differences between key measures.	<ul style="list-style-type: none"> • Bar Chart • Column Chart • Stacked Bar/Column Chart • Funnel Chart • Table

B3. Combined Column Line Chart

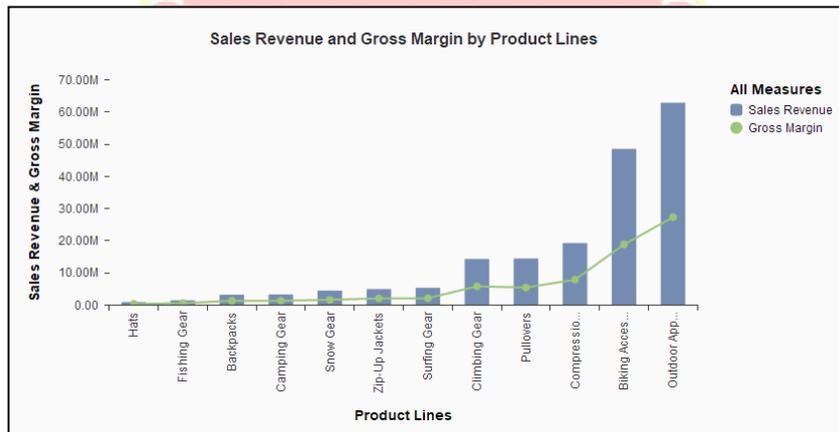


Chart Category	Explanation	Examples
Percentage	Used to show how measures represent percentages of a whole.	<ul style="list-style-type: none"> • Pie Chart • Donut Chart • Combined Column • Line Chart • Treemap

B4. Predictive Line Chart



Chart Category	Explanation	Examples
Trend	Used to identify whether a trend exists in a dataset, especially as it pertains to time-dependent measures. Trend charts are useful in making predictions for the future.	<ul style="list-style-type: none"> • Line Chart • Area Chart • Waterfall Chart • Heat map

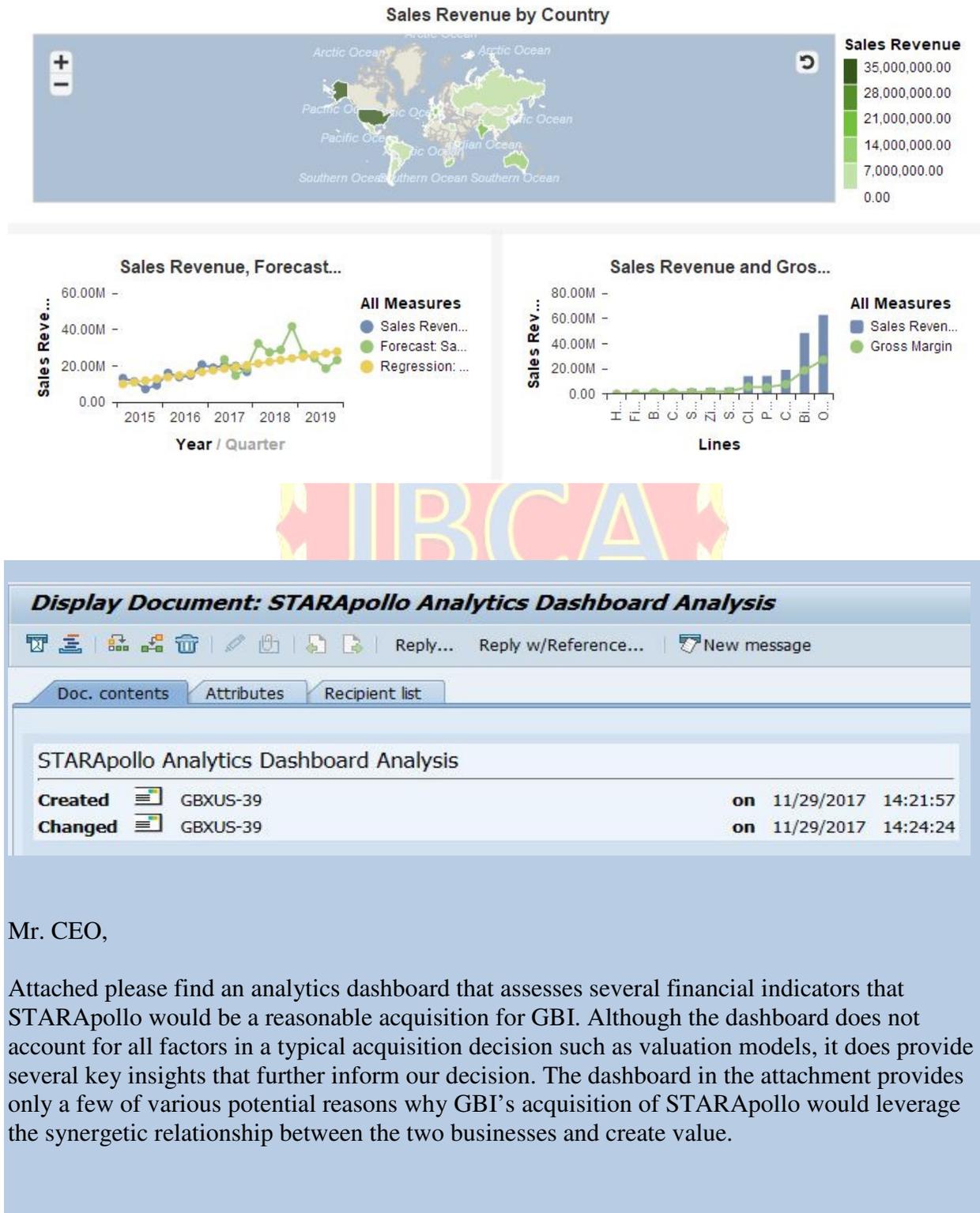
B5. Tag Cloud



Chart Category	Explanation	Examples
Correlation	Used to determine whether relationships exist among variables. Correlation charts are effective in showcasing multi-dimensional relationships too.	<ul style="list-style-type: none"> • Scatter Plot • Bubble Chart • Box Plot Chart • Tag Cloud Chart

APPENDIX C: STUDENT-CREATED ANALYTICS DASHBOARD AND ANALYSIS

STARApollo Big Data Analytics



Mr. CEO,

Attached please find an analytics dashboard that assesses several financial indicators that STARApollo would be a reasonable acquisition for GBI. Although the dashboard does not account for all factors in a typical acquisition decision such as valuation models, it does provide several key insights that further inform our decision. The dashboard in the attachment provides only a few of various potential reasons why GBI’s acquisition of STARApollo would leverage the synergetic relationship between the two businesses and create value.

The first visualization in the dashboard is referred to as a Geochloropleth Chart, and this interactive visualization shows the Sales Revenue figure per country that STARApollo currently operates in. While the United States has the highest figure, the map itself shows that there are established markets in Europe and Asia that are definitely subject to growth. Not only would acquiring STARApollo give GBI access to the STARApollo retail locations and bicycle markets, but it would help GBI establish both its presence and a supply chain in Europe.

In conjunction with the Geochloropleth Chat, the Predictive Line Chart reinforces the notion that a STARApollo acquisition would be valuable. This is due to the fact that the visualization depicts that Sales Revenue is forecasted to grow over the next two years. The forecast presented on the dashboard was completed through using SAP Lumira's triple exponential smoothing prediction algorithm, which is accompanied by a regression line that shows the general upward trend over the five-year span. The increased revenue outlook leads me to believe that the acquisition of STARApollo will enable Global Bike Inc to increase its world-wide market share. I view this scenario as a horizontal merger since both firms have operations in the biking market, and because the synergy will increase efficiency.

The last visualization on the dashboard is the Combined Column Line Chart, which shows the relationship between Gross Margin and Product Line for STARApollo's operations. The Gross Margin trend line shows that STARApollo is very profitable, with about a 50% profit margin on each product line. The most important aspect of this visualization, though, is that STARApollo's most profitable product lines are Outdoor Apparel, Biking Accessories, and Compression Gear – all of which are popular among cyclists because of the well-known brand identity of STARApollo.

In my professional opinion, I believe that the acquisition of STARApollo is justifiable based on the information that can be extracted from the visualizations of their financial data. The acquisition will allow Global Bike Inc to establish its international presence, have control of a subsidiary that produces good that complement GBI's high-quality bicycles, and establish a supply chain in Europe and Asia. I believe that the positives outweigh the negatives in this merger, as the revenue and profitability of STARApollo alone will increase shareholder value for GBI. The only negative associated with this merger is the fact that GBI may have to issue notes payable and create a liability on the balance sheet in order to finance the acquisition.

Please let me know if you have any questions about the analytics dashboard.

Best Regards,

Student

APPENDIX D: ASSESSMENT OF SAP LUMIRA PERFORMANCE

Proficiency and Skill	Methodology	Assessment of Learning
<p>Students will be able to:</p> <ol style="list-style-type: none"> 1. Gain exposure to a highly rated analytic platform used by many businesses in the world today 2. Identify the different types of charts used in assessing performance, pertaining specifically to the type of indicator attempting to be measured 3. Identify, interpret and analyze the various key financial indicators of a simulated company 	<p>Students, along with the professor, will be able to:</p> <ol style="list-style-type: none"> 1. Compose various data visualizations in SAP Lumira, highlighting different levels of performance for a simulated company 2. Break down Geography and Date fields in order to both compare key indicators worldwide, as well as forecast into the future 3. Comprise a dashboard including several of the created visualizations, so that different aspects of performance can be compared within one interactive document 	<p>Students will be assessed by:</p> <ol style="list-style-type: none"> 1. Their ability to discuss the value of data analytics, and relate this topic into the field of Accounting 2. Their ability to navigate to the SAP Business Workplace (email) and send a snippet of a created dashboard to the CEO; using the dashboard, they will analyze the overall performance of a simulated company 3. Using prior financial accounting knowledge to determine whether or not to consolidate with a simulated company, including all aspects of consolidation as a whole