Information and Knowledge Management
ISSN 2224-5758 (Paper) ISSN 2224-896X (Online)
Vol.5, No.3, 2015

Development of Business Analytics Curricula to Close Skills Gap for Job Demand in Big Data

Hasan Omar Al-Sakran
Department of Management Information Systems, College of Business Administration, King Saud University, PO box 2459, Riyadh 11451, Saudi Arabia
E-mail: halsakran@ksu.edu.sa

Abstract
This research paper reviews the external pressure for teaching Business Analytics to business administration students as a necessity in the current era of big data. The cause is obvious. Numerous organizations, businesses, end users are generating incredibly large volumes of data, and new technologies are providing means for creating, transmitting, processing and storing all these data. Consecutively, this is the reason of comprehensible need to find more efficient techniques to analyze data and make use of it as a part of business operations, which in turn cause huge demand for highly trained professionals in this area. New trends and business needs for big data and related technologies force universities to respond with creating business analytics related academic programs. At some stage of planning and developing Business Analytics program a number of issues must be considered to satisfy the industries' requirements. The results of a survey of BA curricula of academic programs and current needs of Saudi Arabia industry in have been used as a basis for development of the Business Analytics (BA) curricula presented in this paper. There is an urgent need for training graduate students to manipulate the enormous volumes of data and present results in comprehensible and concise form. Such a program should get students ready for entry to the job market with specialty in Business Analytics, broaden their knowledge of business, link their acquired knowledge to growing industries, and to prepare students to use results of big data analytics for development of business strategies. Graduates of Business Analytics program will apply their knowledge and skills of business analytics in their work in science, business, healthcare, engineering management, government and finance fields. Business schools in KSA are strongly encouraged to initiate appropriate master degree programs in the proposed BA curriculum to minimize the big data skills gap in Saudi Arabia
Keywords: Business Analytics, Big Data, Curriculum Development, Survey

1. Introduction

Due to the current advances in information and communication technologies we observe a new phenomenon which came into our life as a result of that enormous impact of these new technologies on the world as a whole, and in particular on the business world, referred to as "Big Data", which is generating of massive amounts of data within systems and organizations. Data can be generated by end users and all types of businesses and organizations. Sources of data are numerous: social networks, business interactions, business transactions, sensors and RFID. It can be unstructured or structured. The volume of data produced by applications is increasing at a remarkable rate. Furthermore, new optimization methods and increased data processing speed have become available to convert this big data into information to significantly improve decision making. With continuous advances of digital technologies, mobile computing and the Internet have caused a virtual explosion of data. It was estimated that volume of information was over two zetabytes in 2012, and is expected to be 35 trillion zetabytes by 2020 (FIIB MAC, Marketing Analytics, 2013). According to Economist Intelligence Unit Survey (Eaton Eaton, Deutsch, Deroos, Lapis and Zikopoulos, 2012), the volume of data of 75% of European utilities is expected to grow by 25% over the next three years. According to Bajaj and Ramteke (2014) 90% of the data in the world today has been created in the last two years alone.

Such amount of data requires new methods of designing, analyzing, maintaining, managing, and presenting the resulted information and knowledge to all levels management on where it's going to be used. Finding efficient ways of discovering trends and patterns in aggregate big data and applying that knowledge to real-world business problems necessitate studying the underlying enabling technologies, which in turn will make the handling of big data within systems and organizations more competent. McKinsey Global Institute's (http://www.mckinsey.com/insights, 2013) considered big data as the next frontier for innovation, competition and productivity, and estimated that by 2018 "the United States alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions." Thus, development of analytics skills for business and management program' students has become a requirement. There is an incredible demand for high skilled individuals that can synthesize meaningful narratives from big data to transform all operational aspects of an organization. Dice Holdings stated that on any given day there is an average of 1,894 big-data jobs posted (Noyes, 2014). Analytics of big data is considered as a growing source of strategic asset and competitive

advantage by many businesses.

Over the past few years there has been widespread interest in big data analytics (Rooney, 2012). List of interested parties includes popular technology providers, and industry organizations: IBM, Microsoft, SAP, Johnson and Johnson, Bank of America, Oracle, SAS, Teradata, Apple, and others. Big Data have been placed number 7 in Gartner's Top-10 Strategic Technologies for 2012 (http://www.gartner.com/newsroom /id/1826214, 2011). Academic Initiative, announced by IBM in 2013, proposed extensive academic collaboration of more than 1,000 universities all around the world, with focus on Big Data and analytics. Main goal is to get students ready for jobs that will be created to support Big Data by 2015. More than $100,000 in awards for Big Data curricula has been designated by the company for that program. The Massachusetts state government provides $3 million to launch a new project within the university-industry partnership to build a new big data research and innovation (Malykhina, 2014). At MonsterGulf.com (http://jobsearch. monstergulf.com, 2014) there are dozens of job listings with "business analytics" in the title, and the same required job skill listed in hundreds of others advertized by different private companies and government agencies.

(Sircar, 2009) categorized tangible and intangible business values, generated by BA, as and strategic, informational (fact-based decisions) and transactional (cost savings). It is thought that the management style of managers on all levels and senior executives will be shifting away from control and command to a much more anticipative and facilitating smarter and faster decision making BA can provide information explaining customers' behavior (their purchasing habits, preferences), and cluster customers into similarity groups. For example, big data analytics will find if Facebook postings or Twitter messages will increase an organization's revenue.

Three categories of analytics have been defines as Descriptive, Predictive, and Prescriptive (what is happening, what will happen, and how to make the best of it, respectively) (http://www.informs.org/Community/ Analytics, 2013). While the descriptive (reporting) analytics refers to understanding what is happening in the organization and underlying causes and trends of such occurrences, the predictive analytics is used to determine what is more likely to happen in the future based on statistical techniques and other techniques, developed more recently and falling into data mining category. The prescriptive analytics intention is to examine existing trends and forecasts and use this information for decision making with intent to offer a decision or a recommendation for a specific action.

All categories of businesses are using big data analytics in nearly every aspect of today's life; the list of applications is quite long: Healthcare Analytics, Marketing Analytics, Management and Coordination Analytics, Financial Analytics, Data Architect, Data Scientist, Business Intelligence Developer, Consumer-Centric Analytics or Customer Analytics, Supply Chain Analytics, etc. Users of business analytics will include executives, business analysts, staff, managers, and customers. Even so government agencies can usually extract and analyze big data more efficiently than most of organizations, they expect that big data analytics will enhance their capability to offer services to their citizens and resolve major national challenges in healthcare, natural disasters, economy, etc. (Kim, Trimi and Chung, 2014).

As a result, professionally trained Business Analytics managers are urgently needed to help numerous organizations and firms, both already-existing and new, to integrate seamlessly Business Analytics technologies into their businesses. An adequate BA background will be a must for employees now more than ever. Thus, development of analytics skills has becoming a necessity for business administration students as a future employers in every industry seek out job candidates who can use big data to solve problems and to improve decision making and increase their ability to innovate. The lack of graduate students who can adopt the new big data analytics technologies, create a gap between the growing number of jobs that require big data analytics skills and the available pool of job candidates who can fit these requirements. Time is needed in order to the big data talent gap. As students graduate from BA Master's program, they should gain an understanding of business and deep knowledge in such areas as process optimization and applied statistics, attain core analytic skills to solve business problems and skills necessary to work efficiently in a business environment.

The remainder of this paper is organized as follows. Section 2 presents literature review and related work. Research methodology, analysis of universities' curricula and survey of Saudi Arabia institutions' and industries' needs in relation to business analytics or related fields is introduced in Section 3. In Section 4 the description of the proposed E-business curricula is presented and the conclusion and recommendations are in Section 5.

2. Related work

BA specialists are required to have deep knowledge in the fields of information technology (data acquisition, filtering, parsing, mining, interpretation and disseminating), management science and statistics (analysis and optimization for maximum efficiency and effectiveness), data analysis and data mining. The intersection of the above mentioned areas of study represent the field BA. Business Analytics described as the science exploring precedent business performance and translating enormous amounts of complex data into clear, manageable

information to improve decision making. BA uses data, quantitative and statistical analysis, optimization techniques and predictive modeling to improve the ways businesses work and existing business processes and strategically design new processes. Every major business decision making process now involves analytics (Eckerson, 2012). BA embrace technologies, applications, techniques and people that turn data into the driving force in business activities and decision making.

Big Data Technology, Data Science, Data Mining and Analytics Techniques – this are three composite parts of the BA curriculum.

Big Data Technology category: directs attention to technical courses, such as for Big Data Database Management Systems, NoSQL Databases, Mobile Technologies, Software Interfaces Design, Data Telecommunications, Mobile Analytics, Cloud Computing, Hadoop Open Source that requires no specific business knowledge and support rigorous processing of large datasets across distributed systems.

Data Science category: represents set of courses related to design, collection, analysis, visualization, and interpretation of data within a business environment, which emphases understanding of the significance of legal and ethical considerations that come out in the world of real-time streaming data, big data, analytics, security and privacy.

Data Mining And Analytics Techniques category: includes issues related to understanding and application of data mining and quantitative modeling techniques, predictive modeling (What will happen next?), optimization (What's the best that can happen?), statistical analysis (Why is this happening?), forecasting (What if these trends continue?) and real time predictive analytics to the business problems' solution.

There's a huge gap between the increasing number of jobs that necessitate data analytics skills and the available candidates who possess such skills and can fill these positions (Rowe, 2013). Increase of data volume continues at an exponential rate and clearly is not going to slow down. This indicates that we have a long term problem which is not going away. Chiang et al. deliberate on exceptional opportunities and challenges that BA and big data created for Information Systems programs at business schools (Chiang, Goes and Stohr, 2012). A growing need for workers with BA quantitative and business skills was discussed in (Briggs, 2013). A global research and advisory firm Forrester Research estimated that less than 5% of available enterprises' data are used effectively, largely due to the lack of essential analytical skills needed to handle big data (Hopkins, 2011). The question is how to resolve this problem?

Big Data London group (Raywood, 2012) conducted a survey. Its results showed that 78% of respondents believe there was a shortage of big data professionals, and 70% - there was a big knowledge gap between projects' managers and big data staff. A survey administered by New Vantage Partners (http://finance.yahoo.com/news/big-data -talent -shortage-potential-132900266.html, 2012) established that 60% of respondents said it's very difficult to find and hire big data professionals, and 50% - acknowledged difficulty of finding and hiring business leaders and managers who know how to use big data to identify and optimize business applications. The major reason is the fact that a few universities offer big data major. Academia and business have to work together to define clearly the set of skills and knowledge necessary to manipulate big data across the organization (Miller, 2014). Both business and technical professions will be affected by big data and analytics.

There is an urgent need for new curricula to meet the needs of industry (Vaidhyanathan, 2010). Academic organizations all over the world are working together on filling the gap with advanced degree programs designed to produce graduates who can carry out a data analytics, dig out useful information and communicate it to those who need it. Universities' business and IT colleges around the world responded to the demand of changing curricula in different ways. Number of schools developed Master Degree programs in Business Analytics or Master Degree programs with a concentration in Business Analytics, while others supplemented traditional courses with business analytics. Some universities adopted a program that provides a business analytics certificate or created a track in business analytics within their MBA programs or. Some consider BA to be the best way to teach principles and practices of the evidence-based management in the MBA program (Charlier, Brown and Rynes, 2011), and others - redesign the courses on data analytics (Kennedy, 2014). Yang and Liu (Yang and Liu, 2013) developed a sequel of hands-on lab seminars on business analytics with real-life business data and business relevance to satisfy the industry's demands. A number of universities plan to enhance their higher education programs with BA related courses to smooth the progress of moving toward real-time decision making and data driven design approach within an existing system (Siemens and Baker, 2012). A number of researchers agreed that it is a must for higher education students to gain the ability to contextualize and interpret the data in addition to getting access to data (Chiang, Goes and Stohr, 2012; Vatrapu, Tanveer and Hussain, 2012; MacNeill, Campbell and Hawksey, 2014).

Several elite schools, such as University of California, Harvard, University of Illinois at Urbana-Champaign, Columbia, etc., already have initiated big data analytics related master programs and many other universities are launching programs in big data analytics in order to meet the growing demand and guarantee that their future graduates will acquire necessary skills and knowledge. In the last few years and currently Hundreds

of universities launched new masters programs in Business Analytics in the last few years (http://analytics.ncsu.edu, 2014).

Table 1. Universities with new masters programs in business analytics or related fields

University Name	Degree	Established
Bowling Green State University	M.S. in Analytics	2014
George Mason University	M.S. in Data Analytics Engineering	2014
Saint Louis University	M.S. in Applied Analytics	2014
Southern Methodist University	M.S. in Business Analytics	2014
University of Chicago	M.S. in Analytics	2014
University of Denver	M.S. in Business Analytics	2014
University of Minnesota	M.S. in Business Analytics	2014
University of Virginia	M.S. in Data Science	2014
Arizona State University	M.S. in Business Analytics	2013
Canada's York University	M.S. in Business Analytics	2013
City University of New York	M.S. in Data Analytics	2013
Fordham University	M.S. in Business Analytics	2013
George Washington University	M.S. in Business Analytics	2013
Michigan State University	M.S. in Business Analytics	2013
New York University	M.S. in Data Science	2013
Rensselaer Polytechnic Institute	M.S. in Business Analytics	2013
Texas A&M University	M.S. in Analytics	2013
University of Connecticut	M.S. in Business Analytics & Project Management	2013
University of Maryland	M.S. in Data Analytics	2013
University of San Francisco	M.S. in Analytics	2013
Drexel University	M.S. in Business Analytics	2012
New York University	M.S. in Business Analytics	2012
Northwestern University	M.S. in Analytics	2012
The Stevens Institute	M.S. in Business Intelligence and Analytics	2012
University of Michigan - Dearborn	M.S. in Business Analytics	2012
Carnegie Mellon	M.S. in Business Intelligence & Data Analytics	2011
Louisiana State University	M.S. in Analytics	2011
University of Cincinnati	M.S. in Business Analytics	2011
DePaul University	M.S. in Predictive Analytics	2010
University of Tennessee	M.S. in Business Analytics	2010

Table1 presents a list of some well-known universities that offer newly created masters programs in BA or related fields purposely targeting the big data analytics, mostly in business schools. Nearly all of them prefer as students professionals with work experience with big data and have undergraduate degrees in Engineering, BA and IT.

3. Research methodology

This section presents an investigation of the correlation between Business Analytics or related academic curricula and market demand in Saudi Arabia. Our study make an assessment of industry needs for Business Analytics professionals and the skills required for specific Business Analytics career. A number of surveys have been distributed to IT managers and Business Analytics professionals. Results of these surveys and consequent interviews have been summarized to provide answers on the state of big data in Saudi Arabia.

The objective of this study is to find answers the following questions:

- What managerial and technical jobs in BA sphere are presently in demand in Saudi Arabian organizations?
- What business analytics related courses or business analytics curricula are being offered in Saudi Arabia universities?
- Do the skills and knowledge of university graduates meet the requirements for the business analytics jobs?

The survey have been designed to provide Saudi organizations with a useful benchmark, so they can understand

the current state of organizations' Big Data, and get their opinion on business analytics skills they are seeking in graduates. It includes 16 in-depth questions, for example:

- What is the volume of data in an organization?
- Is big data in your organization growing out of control?
- How important is the real time data-driven decision making and growth the business value of an organization?
- What is the degree of BA acceptance in your organization?
- How difficult is of finding professionals with BA skills?
- What skills must the current university graduates have with regard to business analytics?

3.1 Current state of business analytics in academia of Saudi Arabia

As the result of the program content analysis, a total of 13 courses have been identified. These courses can be classified into three categories: Data Science, Big Data Technology, and Data Mining and Analytics Techniques. The curricula at undergraduate and graduate Programs of IT, business, engineering and science colleges have been investigated. This investigation showed that no major or minor program in Business Analytics or Business Analytics related fields has been offered in any Saudi university. Universities' web sites were analyzed to find out their offerings of BA courses.

Table 2. Universities offering courses in business analytics

Courses in Business Analytics	Number of universities
Human Computer Interaction and Interface Design	5
Introduction to Business Data Analytics	3
Data Mining for Knowledge Discovery	3
Enterprise Information Architecture	2
Business Decision Modeling And Optimization	1
Financial Modeling and Analytics	1
Business Big Data Management	0
Technology for Business Analytics, Platforms and Applications	0
Big Data Security	0
Predictive Analytics	0
Analytics Programming	0
Ethics issues of Business Analytics	0

As can be seen from the table 2, that most of the investigated programs have been placing a strong emphasis on technology related courses, such as Web development programming tools, networking, etc., and traditional business oriented courses for which there is little market demand in the area of business analytics.

3.2. Saudi Arabia market needs

As a part of this research, a study was carried out so as to understand what is expected from graduates by Saudi Arabia industries, to get sense of and critical IT and business areas of knowledge and skills considered necessary. It was based on a structured interviews and questionnaire. 484 people responded to the questionnaire: 121 business managers, 188 IT managers, and 71 IT/management professionals. Interviews were conducted with IT/management professionals such as Quality Assurance Analysts, ERP managers, Senior Project Analysts, Project Managers, etc.; and incorporated 10 open-ended questions related to what IT management described as being an important need for future Business Analytics professionals. Professionals from 27 businesses, including 10 non-profit organizations and 17 medium-to-large businesses participated in this study. To this point, 27 interviews were completed, providing an insight into how organizations see their future as to relate to Business Analytics.

23% of survey respondents were business managers, 49% - IT managers and 27% - IT/management collaboration. 79% of them have Big Data concerns, such as huge volume of data, data variety and the ability to analyze diverse data sources and new data types. Analytic capabilities in Saudi organizations are still a challenge, but even so all respondents are looking forward for Big Data to have a major impact on making smarter real time business decisions.

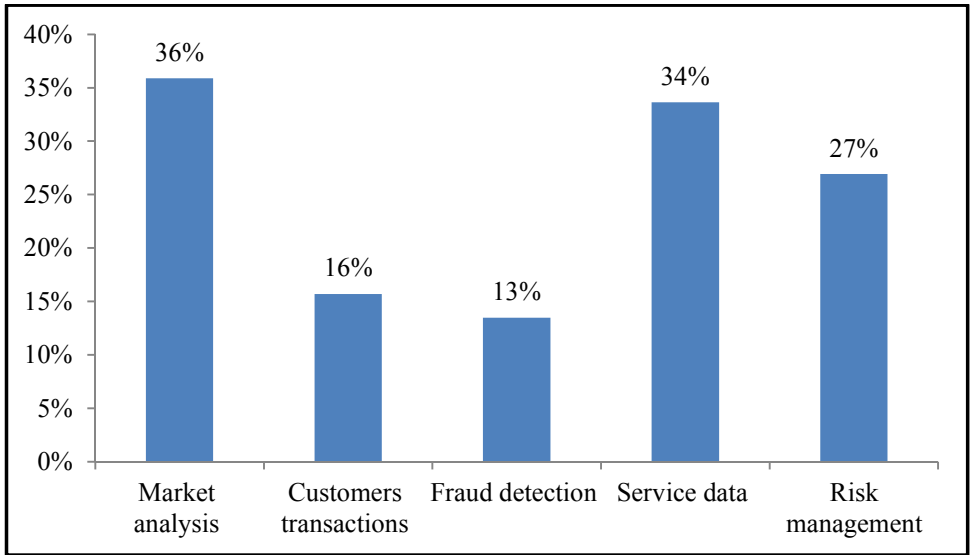

Figure 1. Knowledge domains of BA most important for businesses

Most commonly mentioned domains using analytics of big data are risk management, service data and market analysis, though other domains also have been considered, as shown on figure 1.

Survey respondents also pointed out that one of the most difficult tasks leading to effective utilizing Big Data is to find people with skills required to leverage this Big Data.

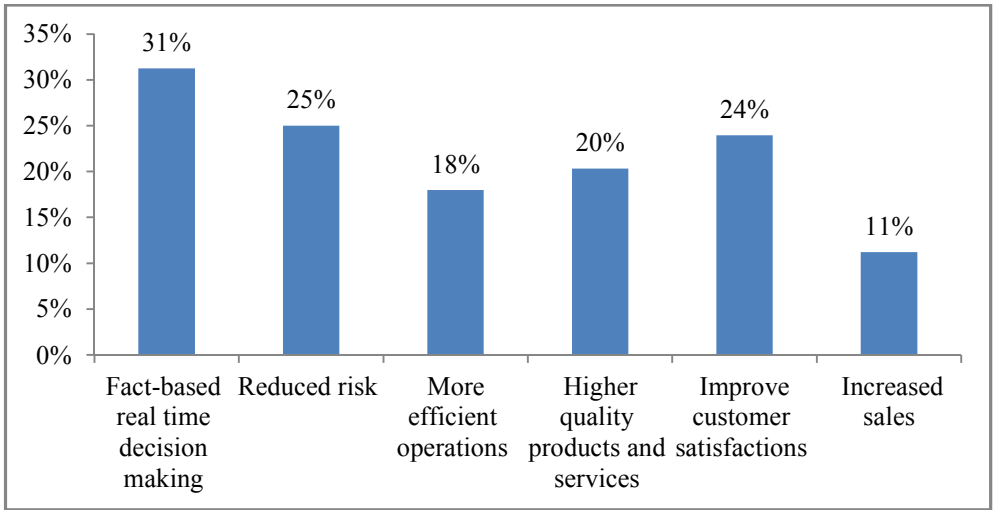

Figure 2. Tangible benefits of business analytics of big data

Survey respondents more often cited the following tangible benefits of using Big Data: improved customer experience, reduced risk and fact-based decision making, as shown on figure 2.

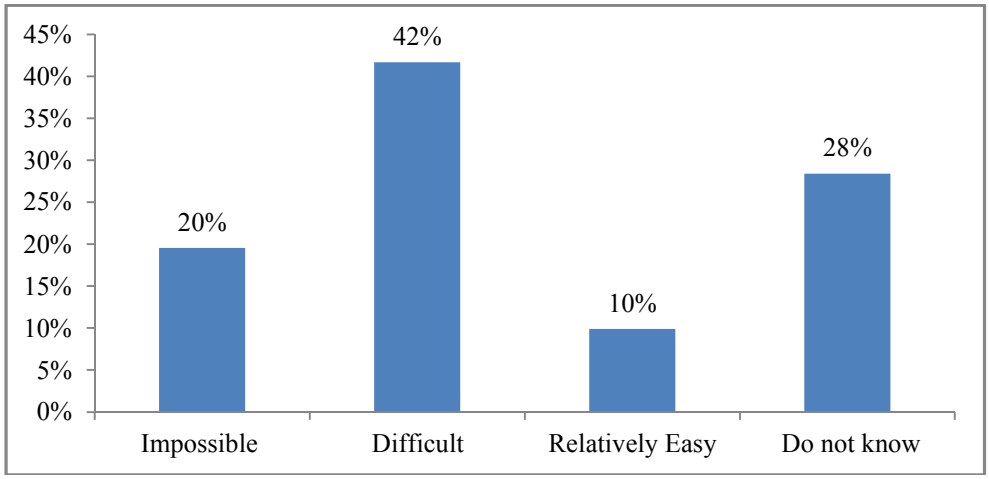

Figure 3. Difficulty finding professionals with analytical skills

Figure 3 shows that 62% (42%+20%) of interviewed business and IT professionals believe that it is very hard or impossible to find and hire big data professionals, managers and business leaders who could recognize and optimize needs of the business with help of big data analytics.

List of other challenges include finding professionals with working knowledge of data sources, skilled analysts; professionals able to identify and exploit business opportunities; and big data threats. Only 10% of survey respondents think it's relatively easy to find skilled human resources.

Saudi market is in desperate need for individuals with deep knowledge of dealing with the complexities of big data in the business and organizational context. The demand for expertise in business analytics is growing in many different applications, including consulting, retail, financial services, consumer behavior, marketing, healthcare delivery, healthcare fraud, social network analysis, fraud and crime detection, supply chain, cyber security, libraries and network security.

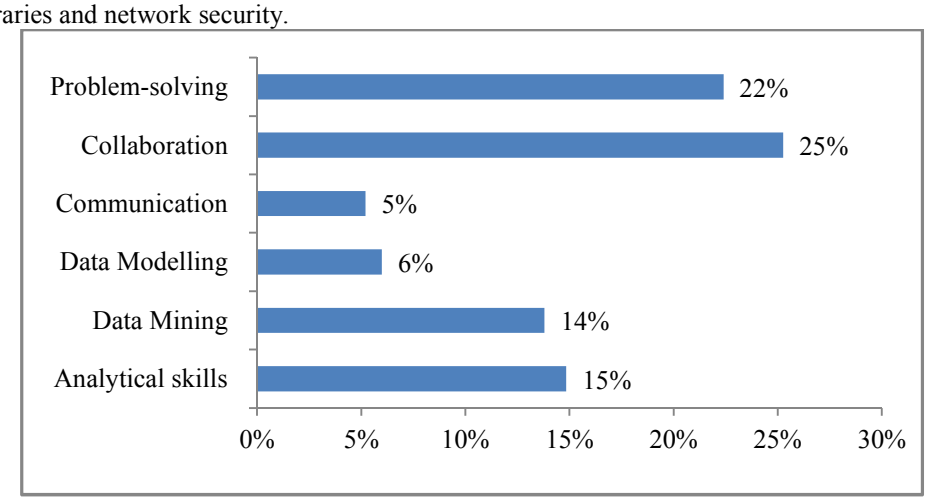

Figure 4. Skills of current candidates for big data analytics jobs

Survey respondents point out that as of now candidates for big data analytics jobs lack too many analytics skills. Figure 4 shows that most of the organizations are not satisfied with the knowledge and skills of university graduates.

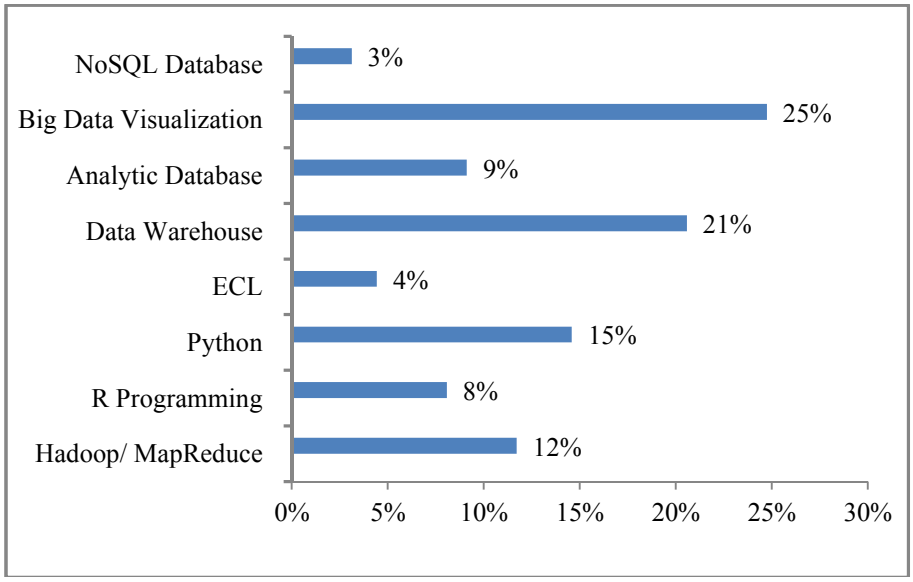

Figure 5. Knowledge and technical skills expected from candidates for big data analytics jobs

Candidates for big data analytics jobs lack deep knowledge of technical tools as shown on figure 5. Very common complaint is of difficulty to find people with required analytics skills. Graduates are lacking skills required by current business environments. Industry feedback suggests that focus should not only concentrate on specific analytics techniques but also on understanding of the business context. Everything is suggesting that lack of qualified professionals is due to the difference between requirements of industry and academic curricula. Part of the questionnaire focuses on identifying of BA professions and specific knowledge and job skills required for working with big data that involves proficiency in numerous disciplines, knowledge and BA employability skills graduates should have (Watson, Wixom and Ariyachandra. 2013; Wixom, Ariyachandra, Douglas, et.al, 2014) to include:

- Ability to understand and recognize business problems and how to find solutions;
- Ability to work in groups;
- Adaptability skills;
- Advanced data mining skills to analyze data;
- Application of advanced analytics to customer and transaction data, and an ability to translate data into more effective customer engagement strategies;
- Be exposed to the constraints and opportunities of leveraging business analytics within the context of a real organization;
- Communication skills;
- Creativity;
- Knowledge and application skills of security methods and policies in big data particularly as they relate to privacy and data security;
- Knowledge of business functions;
- Knowledge of databases , data warehousing for big data;
- Knowledge of hardware, networks, and other technical aspect of IT related to big data;
- NoSQL skills;
- Practical knowledge of techniques for evaluation and selection of hardware and software dealing with big data.
- Problem solving skills;
- Reporting and data visualization skills needed to involve stakeholders on complex issues;
- Risk management skills;
- Time management skills.

4. Proposed business analytics academic curricula

Is the curriculum in Saudi Arabia universities relevant for today's industry needs for big data analytics? Unfortunately, the current graduates' qualifications are far from meeting the needs of the market demands in this area. For us as educators, it is essential to provide curricula that fully prepare students for effective integration into organizations and benefit the industry.

Proposed program of Business Analytics will focus on meeting a significant market demand for

individuals with deep analytical talent for dealing with the complexities and possibilities of Big Data in the business and organizational context. The program focuses on students with exceptional quantitative, technical, and communication skills and combines classroom experiences in statistics, data mining, and programming with functional applications such as marketing, social media, and supply chain analytics.

The proposed curricula also focus on balancing the IT technology, management, and business operations elements in terms of the subject offerings, while place emphasis on the service context. The degree includes a set of core and elective courses in Business Analytics. Core courses are designed to develop core competences and knowledge that improve students' capabilities and understanding of the principles and practice of Business Analytics. The elective courses are design to provide students with knowledge of a wide variety of contemporary issues and topics in Business Analytics systems and their applications.

The core and elective courses of the program are:

- Introduction to Business Data Analytics
- Business Big Data Management
- Business Decision modeling and optimization
- Data Mining for Knowledge Discovery
- Statistical Methods
- Big Data Research Methods
- Big Data Strategy
- Strategy Analytics
- Social Media Analytical Tools
- Data integration skills
- Cloud Infrastructure of Big Data Support
- Enterprise Information Architecture
- Technology for Business Analytics: Platforms and Applications
- Mobile Analytics
- Big Data Security
- Predictive Analytics
- Marketing Analytics
- Overview of Econometrics
- Financial Analytics
- Basic Analytics Programming
- Ethics and Intellectual Property of Business Analytics
- Business Analytics Capstone (which includes an industry-sponsored project that incorporates the benefits of an internship and case competition).

5. Objectives of the proposed business analytics curricula

The Business Analytics program focuses on use of big data for analysis and improvement of business processes. The major expected outcome of the program is providing students with an understanding of BA tools and their application in a business context. The program provides a strong foundation in data analytics by introducing state-of-the-art analytical techniques in Data Management, Data Mining, Applied Statistics, Optimization, Consumer Behavior, Risk Management, and Decision Theory. Students will be trained to solve real problems in marketing, finance, accounting, and scientific applications and acquire skills to: systematically improve existing and strategically design new processes; manipulate databases and analyze large-scale business data to provide actionable insights; understand variability of data and its impact on decision making. Students graduating with a major in BA will be prepared to work with organizations (profit or non-profit) to specify, design, develop, implement, and use analytics to derive information technology solutions that address the organization's big data.

The proposed curricula will introduce students to the latest technologies; provide quality graduate education covering the modern technologies of various BA disciplines; provide higher education opportunities for Information Systems knowledge seekers in order to become eligible for better jobs. Graduates of the Business Analytics program will fill positions in the private or public sectors such as business analysts, data scientists and analysts, data mining architects, business intelligence consultants, and big data managers. Business Analytics students should be also prepared for other careers such as: systems analysis and design, database administration, chief information officer, industry analysis, marketing analytics, predictive analytics. Successful BA professionals must know how to apply IT to a specific business problem and how to integrate IT tools with business processes.

The applicants for this program may come from various backgrounds such as business, IT, engineering, economics, statistics, mathematics, and other related fields. An applicant with business background may have to take the prerequisite courses in IT area, while applicant with an IT background may have to take the prerequisite

courses in business such as operations management, finance, accounting, marketing, economics, and management. This flexibility allows students to concentrate on obtaining the required basic knowledge on other elements that will be helpful in building up the deep understanding of compulsory and elective courses offered.

6. Conclusions and recommendations

The survey results suggest that the current state of BA in universities of KSA may be behind in incorporating effective Business Analytics program and related courses to university students. Lack of leadership and skilled employees capable of analyzing and managing big data are some of the challenges facing organizations. University should take actions to close a widening gap between the BA skills of graduates and BA market needs. Proposed curricula focus on management and practical issues of BA as well as on managerial problem solving theory and designed to minimize the gap between academia and demands of the industry. The curriculum is aligned with the corresponding market demand. Graduates are required to know the technologies and the business as well as an environment where they will work. The results of the survey show high growing demand for professionals capable of analyzing, designing, managing, and maintaining big data and present the resulted information and knowledge to managers on all levels.

Now it is time for Saudi universities to take into consideration the requirements of the new economy and the employability issues and take an initiative to fulfill their role in providing graduates with the necessary set of skills and attitudes necessary to compete on local and regional job markets.

Based on the content analysis, we recommend the following:

- Establish new Business Analytics programs in Saudi Arabia universities.
- Introduce an MIS and MBA programs with concentration area in Business Analytics.
- Emphasize embedding BA knowledge in MIS and MBA programs.
- Graduate students with a broader range of BA skills using an interdisciplinary approach.
- Offer certification programs in Business Analytics for training IT professionals presently employed in Business Analytics and recent university graduates.

The next step in this direction will be designing a Business Analytics system for regular business user that consists of an environment joining together the ease of use and flexibility of visual data discovery tools and complex algorithmic power and sophisticated statistics of advanced analytics tools. This system will be connected to social and internet data sources, including Facebook, Twitter, Salesforce, Google Analytics, etc.; generating predictions, forecasts in moments, without requiring mastery of any special analytic language; and work with all types of data, without remodeling while scaling to support billions of data records.

References

Bajaj, R. H., & Ramteke, P. L. (2014). Big Data – The New Era of Data. *International Journal of Computer Science & Information Technologies*, 5(2), 1875-1885.

Big data the next frontier for innovation, [Online] Available: http://www.mckinsey.com/insights/mgi/research/technology_and_innovation/big_data_the_for_innovation, (March 2013)

Briggs, L. L. (2013). BI Training: Closing the Business Analytics Gap at UT Austin, *Business Intelligence Journal*; 18(4).

Charlier, S.D., Brown, K.G., & Rynes, S, L. (2011). Teaching Evidence-Based Management in MBA Programs: What Evidence Is There? *Academy of Management Learning & Education*, 10(2), 222–236.

Chiang, R. H. L., Goes, P, & Stohr, E. A. (2012). Business Intelligence and Analytics Education, and Program Development: A Unique Opportunity for the Information Systems Discipline. *Transactions on Management Information Systems* (TMIS), ACM , 3(3).

Eaton, C., Deutsch, T., Deroos, D., Lapis, G. & Zikopoulos, P. (2012). Understanding big data: Analytics for enterprise class Hadoop and streaming data. San Francisco, CA, McGraw Hill, [Online] Available: http://www.ibm.com/software/data/bigdata.

Eckerson, W. (2012). *Secrets of Analytical Leaders: Insights from Information Insiders*, Technics Publications.

Malykhina, Elena, (2014). Massachusetts Invests in Big Data Innovation, InformationWeek. [Online] Available: http://www.informationweek.com/government/cloud-computing/massachusetts-invests-in-big-data-innovation/ (April 29, 2014)

FIIB MAC, marketing analytics. (2013). A Whole New Way of Thinking: The Big Data Revolution. [Online] Available: http://www.fiib.edu.in/mac/? tag= analytics-conference, (September 2013)

Gartner Top 10 Strategic Technologies for 2012 [Online] Available: http://www.gartner.com/newsroom/id/1826214, (2011)

Hopkins, B. (2011). Big Data Will Help Shape Your Market's Next Big Winners. [Online] Available: http://blogs.forrester.com/, (September 30, 2011)

http://jobsearch.monstergulf.com, (2014)

IBM, IBM Narrows Big Data Skills Gap by Partnering with More Than 1,000 Global Universities, [Online] Available: http://photos.prnew swire.com/prnh/20130814/NY63777-INFO, (August, 2013)
INFORMS, Analytics Section Overview, [Online] Available: http://www.informs.org/Community/Analytics, (February, 2013).
Noye, Katherine, (2014). Educating the 'big data' generation. [Online] Available: http://fortune.com/2014/05/27/educating-the-big-data-generation/, (2014).
Kennedy, P.J. (2014). Redesign of Data Analytics Major: Challenges and Lessons, *Procedia - Social and Behavioral Sciences*, 116, 1373 – 1377.
Kim, G.-H, Trimi, S., & Chung, J.-H. (2014). Big-Data Applications in the Government Sector. *Communications of the ACM 2014*, 57(3).
MacNeill, S., Campbell, L. M., & Hawksey, M. (2014). Analytics for Education, *Journal of Interactive Media in Education,* (2014)
Miller, S. (2014). Collaborative Approaches Needed to Close the Big Data Skills Gap, *Journal of Organization Design*, 3(1), 26-30.
NewVantage Partners staff, (2012). Big data talent shortage a potential challenge at Fortune 1000 organizations, [Online] Available: http://finance.yahoo.com/news/big-data-talent-shortage-potential-132900266.html, (November 13, 2012).
PR Newswire US, (2014). The 7 Ways in which European Utilities Companies are Converting Big Data into Business Value, (08/07/2014)
Raywood, D. (2012). Big data analyst shortage is a challenge for the UK, *SC Magazine*. [Online] Available: http://www.scmagazineuk.com/big-data-analyst-shortage-is-achallenge-for-the-uk/article/270538/, (December 3, 2012).
Rooney, B. (2012). Big data's big problem: little talent. *The Wall Street Journal*. [Online] Available: http://online.wsj.com/article/SB1000142405270 230472330457736570036807 3674.html (April 29, 2012).
Rowe, A. (2013). The big search for big data candidates. Wanted Analytics Blog, [Online] Available: http://www.wantedanalytics.com/insight/2013/07/06/the-big-search-for-big-data-andidates, (July 6, 2013).
Siemens, G., & Baker, R. (2012). Learning analytics and educational data mining: towards communication and collaboration. *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge*, ACM, (April 2012)
Sircar, S. (2009). Business Intelligence in the Business Curriculum. *Communications of the Association for Information Systems*, 24.
The Institute for Advanced Analytics, (2014). Survey of Graduate Degree Programs in Analytics, [Online] Available: http://analytics.ncsu.edu, (April 2014)
Vaidhyanathan, S. (2010). Crunching words in great numbers. *The Chronicle of Higher Education*. [Online] Available: http://chronicle.com/article/Crunching-Words-in-Great/65777/, (June 3, 2010).
Vatrapu, R., Tanveer, U., & Hussain, A. (2012). Towards teaching analytics: communication and negotiation tool (CoNeTo. NordiCHI '12). *Proc. of the 7th Nordic Conference on Human-Computer Interaction: Making Sense through Design*, Publisher: ACM, (October, 2012)
Watson, H. J., Wixom, B., & Ariyachandra, T. (2013). Insights on Hiring for BI and Analytics, *Business Intelligence Journal,* 18(2).
Wixom, B. H., Ariyachandra, T., Douglas. D., et.al. (2014). The Current State of Business Intelligence in Academia: The Arrival of Big Data. *Communications of the Association for Information Systems,* 2014, 34.
Yang, L., & Liu, X. (2013). Teaching Business Analytics. IEEE Computer Society.

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