"ANALYSING THE ROLE OF BUSINESS ANALYTICS ADOPTION ON EFFECTIVE ENTREPRENEURSHIP"

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Abstract

Business Analytics has emerged as an important area of study for researchers. It is mainly concerned with the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to stimulate decisions and actions. Business Analytics is believed to provide an edge to organizations since it helps offer opportune insights over the competition, helps optimize business processes, and helps drive growth and generate avenues for innovation. Traction related to big data and Business Analytics has increased tremendously in the last decade and a salient challenge for organizations is in understanding how to anchor them to create business value. As organizations launch into Business Analytics initiatives, many tactical questions, such as how to implement Business Analytics in order to generate the most value, come to light. The introduction of big data machine learning into analytics eventually unfolds opportunities for businesses to develop an approach for better decision making thereby resulting in effective entrepreneurship. The use of big data analytics enables the analysis of key influences of business, market dynamics and customer impact. However, very little scrutiny has been applied to understanding the theoretical and practical success factors concomitant to the operationalization of Business Analytics by entrepreneurs in their organizational setup. The objective of this research study is to fill that gap by empirically studying Business Analytics success factors and exploring the impact of Business Analytics on entrepreneurs and their organizations. Following a qualitative study, we attempt to obtain unplumbed insights into the consequences of Business Analytics and possibly shape theoretical and hands-on implementation of Business Analytics for entrepreneurs. Further, we offer a research model framework that captures major elements that not only traverse across industries, but also links these elements to what is most important to organizations: actionable insights that lead to increased performance, amplified competitive advantage, and preferable ethical and legal use of the data.

1. Introduction

In recent years, advances in Business Analytics have offered unrivalled opportunities for organizations to innovate. According to IBM (2013), Business analytics includes "decision management, content analytics, planning and forecasting, discovery and exploration, business intelligence, predictive analytics, data and content management, stream computing, data warehousing, information integration and governance". The insights acquired from Business Analytics, enable companies to develop fresh ideas and improved products and services. The integration of Business Analytics in organizations, constitutes one of the most important opportunities for them to foster transformation into their practices using information technology. For organizations to benefit from Business Analytics and use them to their competitive advantage, effective adoption and implementation is essential. Many business organizations are still struggling to identify the best means and ways to adopt Business Analytics to achieve a successful return (Duan et al., 2020, p. 3).

The success or even the mere survival of entrepreneurial ventures depend largely on their ability to effectively and quickly respond to the complicated dynamics of the global business environment. Over the years, a number of firms have been able to access huge data produced through their business operations undertaken in electronic platforms. Therefore it is crucial to recognize the role of information technology into business processes as stated by Aydiner et al., (2019). Investments made on Business Analytics enablers are continually growing and the business spending on these tools have been rising exponentially. According to the figures revealed in several studies by Accenture and General Electric, 89% of the firms believe that they might lose their market share if they do not adopt Business Analytic tools and Big Data. However, Holsappe et al., (2014) argue that despite this increasing popularity of Business Analytics as an effective tool for business, there exists huge ambiguity with respect to its adoption and its impacts on business performance.

Several researchers like Ciampi et al., (2021) singled out the importance of Business Analytics and has been interpreted as the tool for innovation, competition and productivity for the firms. The possibility of business analytics to follow several innovative entrepreneurial strategies is increasingly changing the business ideas in many industries. Business Analytics driven business processes stimulate knowledge access and sharing and support companies' in developing analytical skills, thus increasing their strategic potential for entrepreneurship. Watson et al., (2018) explain that with the help of successful collection of recent and real-time data on customers' profiles, their behaviours and needs, as well as on other competitors' plans and actions, organizations have the ability to carry out an in-depth representation of the current and future dynamics of the markets in which they operate,

thereby enhancing their propensity to act as early movers in capturing promising innovative opportunities due to less risks and uncertainties involved.

It is evident that with adoption and implementation of Business Analytics, creation of value through decision-making, operational effectiveness, and better business performance can be achieved. Business analytics can be of crucial importance for entrepreneurial practice when correctly aligned with their business processes and needs. The adoption of Business analytics can also lead to significant improvement in their entrepreneurial performance based on the quality of the decisions made. The research on adoption of Business Analytics by entrepreneurs and its role in effective entrepreneurship has been less explored in previous studies as most of the literature studies focus on the effect of Business Analytics on firm performance and better decision making. Very little attention has been paid in determining the theoretical and practical success factors related to the adoption of business analytics in the domain of entrepreneurship. This highlights a research gap and raises the need for a study which explores the impact of Business Analytics on effective entrepreneurship.

1.1 Research Questions

The research questions for this research study are as follows: (1) First, what are the determinants of success due to adoption of Business Analytics for entrepreneurs and their organizational setup? (2) Second, from a macro perspective, what major categories do these determinants of success fall under? (3) Third, what are the consequences of adopting Business Analytics in an entrepreneur's organization? (4) Fourth, what are the challenges faced by entrepreneurs in their organizations to adopt Business Analytics?

The structure of this paper is as follows: The next section reviews the most important Business Analytics conceptually and studies that informed our research study. We then incorporate them into a consolidated model of the success and impact of Business Analytics. We summarize all them together with a discussion of our findings so far, the limitations of our study, and the possible implications of our research study.

2. Literature Review

Aydiner et al., (2019) in their paper highlight the rapidly increasing popularity of Business Analytics, and investigated the determinants of the adoption of Business Analytics and its resulting impact on business performance. The study proposed a model to examine the effects of the adoption of

business analytics on business process performance and the role that business processes play in the relationship between the adoption of business analytics and business performance. The results of the study indicated that the adoption of Business Analytics positively influences business processes. Whitelock (2018) in his study also followed a similar narrative and proposed a comprehensive framework to explain the important types of business analytics, their relationships that exist within them, and how their use can impact the operational and financial performance of the firm. The study typically examines a combination of the fundamental systems, "decision-making," approaches to curb the key relationships that impact performance. Results of the study indicated that businesses that are struggling to use data to enhance their performance, have a possible cost-effective framework to adopt business analytics in their organizations.

Ramanathan et al., (2017) also state that, adopting Business Analytics applications may not translate directly into a successful Firm Performance; but instead, process-level performance may behave as a mediator between the BA adoption and Firm Performance. Furthermore, the organization specific frameworks for Business Analytics adoption has the acute ability to create value for a firm as it can provide the benefits of improving business processes in the accomplishment of the Firm Performance through the creation of competitive advantage in the market.

Cao and Duan (2015) in their study examined the mechanism through which business analytics can be adopted to improve the effectiveness of decision making at the firm level. The paper created a research framework to show the linkage between business analytics and organizational decision making effectiveness. The major findings of the study suggested that there were no statistical differences between the large and medium firms with respect to the paths from business analytics to decision making effectiveness, however, there were few differences between manufacturing and professional service firms. The results largely contributed to the existing literature on business analytics by offering detailed insights into business analytics applications and the subsequent data-driven decision making process, as well as managers' knowledge and understanding of how business analytics should be implemented to improve decision making effectiveness.

Sharma et al., (2014) in their study mainly argued that the evidence that business analytics leads to better performance needed further analysis. They particularly analysed the role of business analytics on organizational decision making processes, including resource allocation processes and the need to better understand these in order to identify how businesses possibly create value from the use of business analytics. Precisely the paper proposed that the effects of business analytics are most likely to be on decision making processes of a firm and that improvements in its performance could potentially be an outcome of superior decision making processes facilitated by business analytics. Therefore it studies the relationship between business analytics, decision making processes and

organizational performance and how the use of business analytics could help organisations move towards decision-making processes that are more informed by comprehensive design and creativity. However, their findings suggest that the way in which organisations deploy Business Analytics technologies has an important bearing on their ability to create and capture value. In particular, they suggest that managers have to pay particular attention to transforming their decision-making processes if they are to capture the value that is possible through the use of business analytics. McGrath and MacMillan, (2000) explain that organizations exercising further investments of managerial and financial resources to transform their decision making and accommodate the evaluation and resourcing of real options generated by the use of business analytics, only then would they be able to generate any value for organisations.

Amoaka (2013) in his paper highlighted the importance of business analytics as a decision making tool. It attempted to investigate whether the adoption of Business analytics could possibly help in an organization's strategic decision making. According to the study, in order to hoard large volumes of data from various sources through their business processes and remain competitive in the face of this dynamically changing business world, managers need to be spontaneous decision makers. Therefore business analytics serves as a tool for performing large operations easily and providing more clarity on the behaviour of the managers. This study adopted a qualitative approach and conducted interviews on managers at the Electricity Company of Ghana and found that the haphazard nature of the existing systems causes delays in the information search and affects decision making. Therefore, introduction of business analytics would be a worthwhile tool to influence strategic decision making.

Sedkaoui (2018) highlighted the transformation experienced in business organizations as a result of the rise in business analytics. The main purpose of this paper was to establish a fresh perspective to discuss the notion of big data and business analytics, and identify ways to re-think new ideas both for the entrepreneurs and the managers in the area of analytics. Therefore the role of business analytics in the context of entrepreneurship and the rise of data entrepreneurs was the primary objective of the study. According to the study, big data analytics are frequently being adopted in businesses especially in companies that are in the quest for new methods to develop smarter capabilities and manage challenges in the transformational processes and want to navigate the effectiveness of such methods in entrepreneurship. Cosic et al., (2015) also followed a similar approach and suggested the importance of business analytics for effective entrepreneurship.

Neumeyer (2021) established a study in the same direction and stated that almost every entrepreneur shares a universal goal of transforming ideas into an operational business proposition. According to his study, the entrepreneurial path followed by the Big Five like Amazon, Apple and

Google was based on years of work towards incorporation of data-based insights into their business processes and operational functioning. An information driven business strategy coupled with substantial goals and objectives, stimulate measurable results and redefine the decision making process. Associating specific objectives with valuable data furnishes significant information for the organization that results in effective entrepreneurship.

Bayrak (2015) explains the link between the transformation of business models, decision making, and organization building to advanced analytic capabilities being adopted within organizations. The findings in this study state that a growing number of companies rely on business analytics to plan and optimize their business operations, forecast their business outcomes, improve efficiency, make better decisions, offer new products and services, and capture new market opportunities. In this study, they conclude that with all tools, models, technologies, opportunities, and capabilities that business analytics presents BA is not a passing fad, rather is a much promising paradigm shifter.

As argued by Davenport and Dyche (2013), no single business trend in the last decade has as much potential impact on incumbent IT investments as Business Analytics. Business Analytics has given many a company the ability to handle new types of data such as voice, text, log files, images, and video, and decision makers increasingly view this new type of data and the ability as an important driver of innovation and a significant source of value creation and competitive advantage. Tan et al., (2015) explain that like many new branches of information technology, Business Analytics can bring about dramatic cost reductions, substantial improvements in the time required to perform a computing task, or new product and service offerings. However, companies investing in adoption of Business Analytics technology should address certain challenges and pitfalls to fully realize the benefits their initiatives have to offer. For instance, Davenport (2006) argues that companies should understand that to make optimal use of BA and the data they constantly collect and store, they should invest in finding the right focus, building the right cultures, hiring the right people, and installing the right technology.

Raghupathi, V. and Raghupathi, W. (2021) describe in their study four types of Analytics – Descriptive Analytics, Predictive Analytics, Prescriptive Analytics and Discover/Wisdom Analytics and in addition to these 4 types, they identify in their study the three pillars of analytics that inform business modelling – visualization, statistical modelling and machine learning as laid out by Barga et al., (2015). However, Raghupathi, V. and Raghupathi, W. (2021) also mention in the end of their contemporary review that theirs is neither an empirical study nor is it a summary review of the extant literature but conclude that progress and changes in digital technology, especially analytics, has driven businesses to transform their existing models to keep up with the innovation. Agarwal et.al, (2014) and Muntean (2018) positively reinstate that as businesses strive to derive value from data to increase

performance, Business Analytics operations influence the decision-making process of various stakeholders like individuals, society, and the environment. These shifts can, they say, in turn, lead to business and societal transformation as conceded by Chen et al., (2012), Loebbecke et al., (2015) and Kim et al., (2018) in their findings.

Clearly, business analytics is not simply a technical matter for organizations and business leaders. McAfee and Brynjolfsson (2012) in their study highlight five challenges: leadership, talent management, technology, decision-making, and company culture for organizations in becoming data-driven. These arguments also raise the question of: what comprises value for an organization? Value is the monetary worth of various benefits a customer receives from a product or service, compared to the price paid and the cost of ownership and taking into account competitors' offerings – the premise being that providing more value is a source of competitive advantage, argue Lindgreen et al. (2012). For example, Pandey (2016) notes that Wal-Mart handles 2.5 petabytes of data per hour across its global retail operations. The issue of value metrics continues to be critical to organizations in an era of exploding data sources, tools and methodologies particularly in tactical matters such as stock acquisition and inventory management of fast-moving consumer goods. Further, Pape (2016) states that there is an issue of what data needs to be stored in its systems to perform business analytics on to extract value – most data is internally generated and there are high costs to clean and maintain new data as well as costs to simply store this data. Kiron and Shockley (2011) concur and highlight in their study that organizations have to develop data oriented management systems and skilful teams to handle them to make sense of the increasing volumes of data and address the need to create not just business value but also create a competitive advantage.

While there seems to be a relationship between utilising Business Analytics and making informed decisions with better insights, it is quite ambiguous about the conditions under which better outcomes would be observed. Simon (1947) models decision making as a three-step process of intelligence, decision and choice, and there can be an emergence of multiple alternatives in the design phase following the intelligence phase of decision making. So, there seems to be no one-to-one correspondence between an insight and a clear course of action to exploit an insight obtained by Business Analytics. Another issue is that organisational decision-making processes have an important bearing on how insights from Business Analytics are converted into decisions. Stories of Microsoft's delayed and reluctant push into the internet space; Xerox's regrettable decision to not go forward with the development of a personal computer; Kodak playing catch up in the development of the digital camera are perhaps urban myths, and stuff of legends but illustrates situations where good ideas, insights and even breakthrough products are rejected by organisations, only to become blockbuster successes for other organisations.

Good insights from Business Analytics need not necessarily result in good decisions and bad decisions are possible too as although insights serve as an important input to the decision-making processes, decisions taken are influenced by many other factors. Committing to a specific decision option after evaluation of a created set of options is a derivative of complex organizational decision-making processes. Drucker (1967); Vroom and Yetton, (1973) in their classic research work state that deciding what a good 'decision' is very complex in itself.

Popovič et al. (2012) developed a model of business intelligence systems (BIS) success that comprised business intelligence dimensions of BIS maturity, quality of information content quality, quality of information access, analytical decision-making culture, and use of information for decision-making. BIS maturity refers to the state of the evolution of BIS within the organization. Information content quality, in the BIS context, refers to information pertinence or quality of output. Information access quality refers to the bandwidth, customization capabilities, and intercommunication offered by the BIS. Analytical decision-making culture refers to the outlook towards the use of information in decision-making processes within the organization. Use of information for decision-making refers to the application of obtained and information disseminated to organizational decision-making. They tested their model on data gathered from 181 organizations and observed that BIS maturity has a significant impact on information access quality. Their results also showed that information content quality, and not information access quality, was germane for the use of information for decision-making, and that analytical decision-making culture refined the use of information for decision-making while quelling the direct influence of information content quality.

Business Analytics has observed its applicability in different business sectors, however, this study is limited to understanding the effect of business analytics adoption on organizations who prioritize entrepreneurism as a culture specifically. The study aims at understanding the overall effect of the Business Analytics process in general and does not cater to applicability of different types of business analytics tools. There is a significant amount of scope for researchers to investigate the link between Business Analytics adoption and performance of an organization through a variety of theoretical lenses. However, examining the roles of Business Analytics capabilities, culture of the organization and commitment of the top management in Business Analytics adoption, can be considered as moderating variables to further knowledge in the big data economy.

3. Research Proposal

3.1 Research Methodology of the study

According to Silverman (2020), qualitative research focuses on those attributes of the entities and supports those methods and logics which are based on human understanding with observations and the respondents are evaluated in their natural background. The study is based on observed and measured phenomena and derives knowledge from actual experience rather than from theory or belief. To achieve research objectives, we are following a qualitative-empirical research design. We have adopted the grounded theory methodology by Glaser & Strauss (1967) that accounts for, and uncovers, organizational activities and behaviours with regards to business analytics. As laid down by Orlikowski (1993), the grounded theory approach is becoming steadily common in IS research literature because of its effectiveness in helping develop rich context-based descriptions and explanations of the phenomenon being examined. This methodology also enables researchers to "produce theoretical accounts which are understandable to those in the area studied and which are useful in giving them a superior understanding of the nature of their own situation" (Turner 1983, p. 348).

We gather data through semi-structured interviews with entrepreneur executives and experts in business analytics such as: Founder, President, Chief Executive Officer (CEO), Chief Operating Officer (COO), Chief Finance Officer (CFO), Chief Privacy Officer (CPO), Director, and General Managers (see *Table 1*). So far, we have conducted 15 interviews with 20 informants from 12 organizations globally so far. Our selection can be considered a convenience sample that allowed us to achieve a large number of executives. We are trying to achieve sufficient differentials across the organizations with respect to industry (banking, healthcare, insurance, manufacturing, retail, technology services, etc.), interviewees' roles (Founder, Co-Founder, CEO, CPO, etc.), organization size (5 to 2000 employees), and interviewees' area(s) of expertise (Leadership, IT, Finance, etc.) in order to avoid any prejudice. On that account, we are interviewing informants with different expertise across multiple industries (see *Table 1*). The interviews addressed ten major question categories (see *Table 2*) and lasted between 35 and 90 minutes. Interviews so far have been conducted online or offline between July 2021-November 2021 and will continue till November 2022 and are being recorded and transcribed.

Interview /Interviewee	Industry	Employees	Interviewee Role	Interviewee Area(s) of Expertise	Length
1/1	Revenue Cycle Management	500	Founder and CEO	Leadership	45 min
1/2	Revenue Cycle Management	500	President and COO	Leadership	45 min
1/3	Revenue Cycle Management	500	Vice President	Leadership	90 min
2/4	BPO and Staffing	200	General Manager, Operations	Leadership	90 min
3/5	Revenue Cycle Management	500	CPO and Senior Director, Client Services	Client Relationships and Information Privacy	45 min
3/6	Revenue Cycle Management	500	CFO	Finance	45 min
3/7	Revenue Cycle Management	500	Director, HR	Human Resource	45 min
4/8	Information Technology and Services	500	General Manager, Information Technology	Information Technology	60 min
5/9	Textile Manufacturing	25	Founder and CEO	Leadership	35 min
6/10	Learning and Development	5	Founder and CEO	Leadership	45 min
7/11	Learning and Development	5	Founder and CEO	Leadership	60 min
8/12	Hotel and Service Industry	35	Co-Founder and Managing Partner	Leadership	60 min
8/13	Information Technology and Services	55	Co-Founder and CEO	Leadership	35 min
9/14	Information Technology and Services	55	Co-Founder and CTO	Leadership	45 min
10/15	Information Technology and Services	10	Co-Founder and CEO	Leadership	45 min
11/16	Information Technology and Services	15	Managing Partner	Sales and Business Development	40 min
12/17	Information Technology and Services	450	Co-Founder and CEO	Leadership	45 min
13/18	Event Management	65	Co-Founder and Managing Partner	Leadership	60 min
14/19	Event Management	25	Co-Founder	Leadership	35 min
15/20	Agriculture	95	Co-Founder and CEO	Leadership	45 min

Table 1. Data Collection with Entrepreneurs and Executives

#	Section	#	Questions
1	General Information	a	About the informant (title, education, years in the profession and industry)
		b	About the organization (size, location, industry, number of employees)
		c	Your understanding/definition of Business Analytics
2	Design and Implementation Strategy	a	Current Business Analytics system in use
		b	Implementation by department, function or at the organizational level
		c	Role of Founder/CEO/CTO with regards to Business Analytics
		d	Role of Chief Analytics Officer (CAO) if any
		e	How is Business Analytics implemented? At department/At the corporate level?
3	Techniques and Processes	a	For collection, management, storage, integration and exploitation of data
		b	Descriptive, predictive, and prescriptive analytics
		c	Is Business Analytics in-house of outsourced?
		d	Visualization
4	Data Management	a	Data capture, Data cleaning, Data ingestion, Data consolidation, and Data Visualization
		b	The amount of data used in Business Analytics
5	Culture	a	Support from executives/organizational culture
		b	Organizational openness to new ideas and approaches that challenge status quo
		c	Business Analytics and a power shift in the organization
6	Driving Value	a	The major drivers into embracing Business Analytics
		b	Pressure from senior management
		c	Best practices to achieving competency in analytics
7	Challenges and Barriers	a	Most pressing issues you are dealing with in regards to Business Analytics
		b	Barriers to adoption/implementation
		c	Costs associated with implementation of Business Analytics
		d	Buy-in from other functions/leadership
		e	Qualified critical thinkers, Ownership (IT, analytics staff)
8	Privacy and Security Issues	a	Privacy practices with regards to Business Analytics
		b	Laws and regulations you have to comply with in your industry
		c	Ethical use of big data and analytics
9	Business Analytics Skills and Resources	a	Skills (technical/business) needed to succeed as business analysts
		b	Balancing analytics, intuition and business acumen
		c	Required skills to be taught in graduate/undergraduate programs
10	Best Practices	a	Most successful best practices within your organization
		b	Plans for more advanced Business Analytics techniques and processes
		c	Business area were you able to significantly improve upon, create differentiation and drive growth
		d	Functional areas you are planning to make investments in analytics technology in the next 12 months, and/or have already made investments in the past 12 months
		e	Forward-looking analytics innovations you can apply to meet their mounting challenges

Table 2. Semi-Structured Interview Protocol

3.2 Collection and Analysis of Data for the research study

For the purpose of lucidity, we lay out a brief outline of the tasks taken up during the grounded theory approach. (1) First, for data collection, all interviews are recorded and then transcribed into Microsoft Word documents. (2) Second, as a part of data examination and analysis, each transcribed interview is imported into Dedoose. Dedoose is a web-based application that allows the user to organize and analyse research data, independent of the form the data takes. As per Dedoose (2021), it is a cross-platform app for analysing qualitative and mixed methods research with text, photos, audio, videos, spreadsheet data and so much more. Transcripts are then manually coded. This involves selection of the pieces of raw data and creating and assigning codes to describe them using inductive reasoning, meaning that we did not use a predefined set of codes, but rather let the codes arise from the data as a result of observations of patterns. For the first order analysis, we adopted an open approach to coding in order to brainstorm and to open up the data to all possible potentials. Coding involved identification and comparison of key concepts using Strauss & Corbin's (2008) constant comparative analysis.

Our first order analysis results so far have indicated that certain categories emerged, but not all relationships were interpreted. Corbin & Strauss (2008) refer to this next step as axial coding, qualitative research technique that involves relating data together in order to reveal codes, categories, and subcategories ground within participants' voices within one's collected data. This is the act of relating concepts and categories to each other and constructing a second order model at a higher theoretical level of abstraction. Axial coding is one way to construct linkages between data. This step involved an iterative process of collapsing our first order codes into theoretically distinct themes as laid out by Eisenhardt (1989). (3) Third, we are weighing up existent literature to identify potential contributions of our findings. Our evaluation consists of business analytics related work with a special focus on existent theories and frameworks at the organizational level. Upon reviewing of the strengths and the weaknesses of existent literature in this area, we are making decisions to focus on the success factors of business analytics and the consequences of business analytics. (4) The fourth stage of our grounded theory approach involves determining how the various themes we identified could be linked into a logical and methodical framework.

To ensure that our analysis meets the following criteria for reliability as laid down by Lincoln and Guba (1985): credibility, transferability, dependability, and conformability, we have employed the following steps: (1) Rely on the expertise of the primary researcher who has significant industry experience in organizations adopting Business Analytics, (2) Provide a detailed first order analysis of the findings, (3) Author attempts to review code of the same three interviews individually with another researcher or co-author and compared their coding line by line to arrive to an agreement when certain

excerpts from the interview transcripts were coded adversely. The remaining interviews are split between the author and reviewer or co-author, however, the new codes that emerge will be revisited and compared. Member checking is achieved by sharing the preliminary findings of this study with participants or informants for these interviews and soliciting their feedback on the interpretation of the data obtained by researchers. A general consensus suggests a reasonable degree of validity of the constructs and relationships in the unified research model for the success and impact of Business Analytics.

4. Findings

This research study investigated the ways in which entrepreneurs and their organizations operationalize their Business Analytics practices. A grounded theory based analysis of the data led to a better understanding of the disparate Business Analytics success factors as well as the valuable impact on the business because of Business Analytics. In this section, we consolidate what we have analysed so far from the informants by combining both the first order codes and second order themes to hand out our grounded theoretical model for success and impact of Business Analytics (see *Figure 1*).

The established framework (see *Figure 1*) not only captures major methods that span across industries, but also couples these methods to what matters most to organizations: actionable business analytics that steers them to surging performance, rising competitive advantage, and better ethical and legal use of the data. These findings are further supported by a report from Gartner (2014) that states that their future predictions focus on the cultural and organizational elements impacting big data deployments used in organizations and by entrepreneurs. With the focus shifting away from technology, enterprises and entrepreneurs will face tough questions on deployments, investment and transparency as they relate to big data analytics.

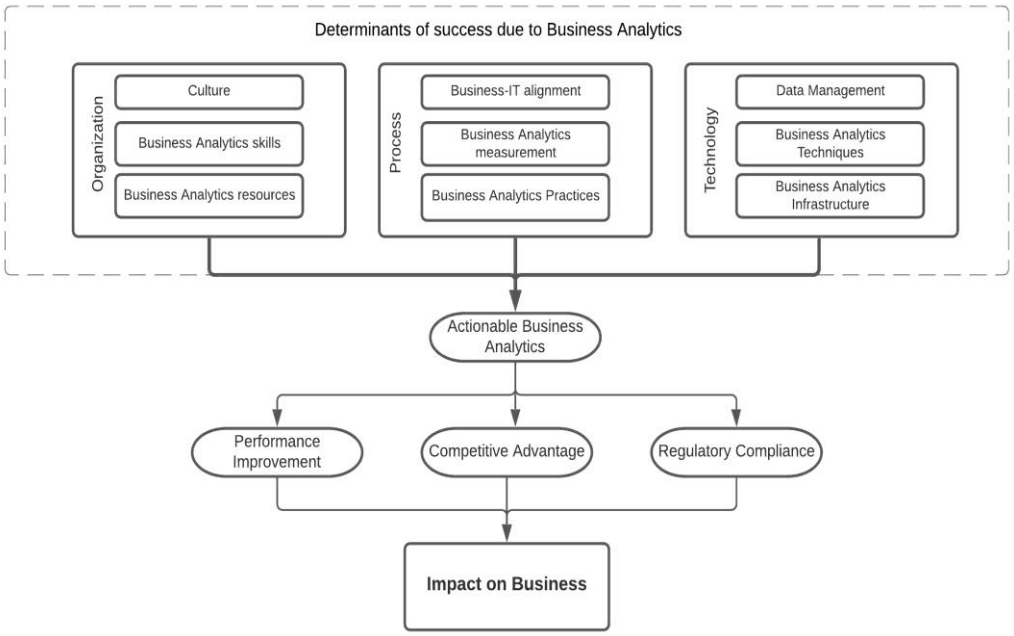

Figure 1. Research model: Model of Success and Impact of Business Analytics

With this research study, we are attempting to make a key contribution to the field of Business Analytics: (1) First, using a grounded theory methodology provides a copious lens to comprehend the factors of success and impact of Business Analytics. (2) Second, this study is designed to gain an in-depth understanding of how entrepreneurs and their organizations from different industries operationalize their Business Analytics practices consequently addressing directly the dominant obstacle to wide spread adoption of Business Analytics, which is a lack of understanding of how to use analytics to improve business, as studied by LaValle et al. (2011). (3) Third, this research seems to be confirming the recent industry predictions related to Business Analytics deployment challenges by offering in-depth insights on organizational, process-related, and technical constructs as laid down by Gartner (2014).

Our research is also attempting to make an essential contribution to the area of IS education: (1) First, from an organizational success factors standpoint, this study should strengthen IS education by enable a dialog between Business Analytics practitioners disparate industries and academic professionals to address development of skills and human resource requirements in the field of Business Analytics. Our findings show that three skills: technical, business, and soft skills are critical organizational success factors related to implementation of Business Analytics by entrepreneurs in their organizations. So far, we have also determined that there is a lack of appropriate talent in Business Analytics. The market growth for Business Analytics was estimated to be $185 billion by the end of year 2015 by IBM (2013). McKinsey (2018) in their report estimated a shortage of around

200,000 people with Business Analytics talent and a shortage of around 1.5 million Business Analytics managers. Our findings highlight the immediate need for business schools to redesign the way Business Analytics skill development is required to be built into their curriculum to address this shortage.

(2) Second, from a process related success factors standpoint, our findings suggest that there is a need for business schools to teach industry standard best practices for Business Analytics that include integration, standardization, and the ability to provide a single unified view of data across the entire organization. Third, from a technical success factors standpoint, our findings show that business schools need to incorporate a variety of techniques from Business Analytics like predictive analytics, programming, data mining, etc. to teach data management using several different tools like Microsoft Azure, IBM Watson Analytics, etc.

4.1 Determinants of success due to Business Analytics

Table 3 portrays the identified determinants of Illustrative quotes for determinants of success due to Business Analytics. Our findings show that three skills: technical, business, and soft skills are critical organizational success factors related to implementation of Business Analytics by entrepreneurs in their organizations.

Based on analysis of data available so far, our finding suggest successful Business Analytics is determined by three major groups: (1) Organizational factors which include culture, Business Analytics skills and resources; (2) Process-related factors that include Business-IT alignment, Business Analytics metrics, and adoption of best practices established in the area of Business Analytics; and (3) Technology-related factors that contains data management, Business Analytics techniques, and Business Analytics infrastructure. The central concept for success due to Business Analytics as indicated by various informants and interviewees, refers to the extent to which a set of clearly defined and transparent organizational, process-related, and technical factors are coherently applied.

Dimension	2nd Order themes	1st order concepts
Organization	Culture	Leadership buy-in
		Buy-in from other functions
	Know-how	Technical know-how
		Business know-how
		Soft know-how
	Resources	Cost of Business Analytics
		Cost of Human resources
Process	Best Practices	Unified view of data
		Integration between disparate systems
		Standardization
	Business-IT alignment	Business focus
	Quantification	KPIs
		Metrics
		Dimensions
		Scale of maturity in Business Analytics
		Scorecards
Technology	Data Management	Data quality
		Data integrity
		Data governance
		Data maturity
	Techniques for Business Analytics	Predictive analysis
		Programming
		Data warehousing and mining
	Infrastructure for Business Analytics	Tools and technology frameworks
		Cloud Business Analytics
		Outsourcing and in-house

Table 3. Determinants of success identified. Based on Illustrative quotes for determinants of success due to Business Analytics from Table 4

2nd Order Themes	Illustrative 1st Order Data
Culture	"Frankly, I think it's because they have or don't have the leadership buy-in to really focus on analytics capabilities. Business Analytics has always been in our top 5 strategic initiatives, and we try to aggressively capabilities. It has a board level, leadership and departmental focus."
Know-how	"Good Business Analysts are rare as it's kind of an unusual talent to find in the same person. It's a mix of someone understands the technology at a very high level to utilize the tools also while understanding the problems faced by the business. The skills are sometimes too vague to describe."
Resources	"The biggest issue at hand are resources. We just don't have enough. It takes a lot of effort keeping the project going, and then there's the associated costs. It holds us back in terms of implementation of improvements and new frameworks."
Best Practices	"We have disparate systems that do not talk to each another, like billing and accounting receivables system, general ledger system for accounting, HR system to manage our staff, CRM, tools for workflow management, and we have different encoder systems for revenue cycle management. We have attempted to drive the integration of technology, aggregate and visualise it to our benefits."
Business-IT Alignment	"In a marketing campaign if I am measuring people that replied to my offer for a providing staffing services, let's say I get a 5 percent response and that's profitable for me, and through Business Analytics I can drive it to a 7 percent response and everybody is over the top now, but when I get to 7 percent my profit stays the same. The reason my profit stays the same is that the first response is not the ultimate answer to customer acquisition. Because the consumer replies to my offer, I now have to verify their business is large enough to get that 5 member staffing deal or that 25 member staffing deal. I am only getting a partial picture. Someone that doesn't understand the BPO or staffing industry, the Business Analyst may not even realize that what I need to be measuring is not just the initial response but also how many get through to the actual sales process to actually become a paying client."
Quantification	"If you go to somebody and say what your business problems are, they talk about supply and demand, logistics, or they talk about the economy or this that or the other. In a lot of these cases they may not even know what their business problems really are. If the business is mostly run by intuition and by the book, a lot of the performance issues are hidden."
Data Management	"I think something that is of prime importance to me is the integrity of the data and the standardization. It's not open to misinterpretation, so one of the challenges is to move in the direction of more self-service Business Analytics, but then that complicates the data governance side of things because as you open up more ad hoc capability. Now you are putting more on the users in terms of ownership in understanding on how to use the data. It kind of goes back to the whole governance and data integrity thing. It's tricky"
BA Techniques	"Applying more data warehousing and mining techniques and doing this pattern detection, and analysis of historical data has been of great help."
BA Infrastructure	"The difference from SQL Server or Mongo DB - you could learn the differences, but those reporting tools are all very different. You compare Sisense to PowerBI to Tableau - all are different from one another, you have got to go to a training class to learn. You can't just pick it up."

Table 4. Illustrative quotes for determinants of success due to Business Analytics

4.2 Impact of Business Analytics

Table 5 establishes identified impacts of using Business Analytics. These include actionable business analytics, performance improvement, competitive advantage, and regulatory compliance.

Dimension	2nd Order themes	1st order concepts
Business Impact	Actionable Business Analytics	Recommendations on the states that have the highest potential for success
		Exceptions
	Performance Improvement	Identification of wastage
		Reducing costs
		Improving bottom-line
		Fraud detection
		Time savings
		Transparency
	Competitive Advantage	Negotiation
		Advantage
	Regulatory Compliance	Ethical use of data
		Compliance with privacy and security guidelines/framework

Table 5. Establishes the identified impact due to Business Analytics. Illustrative quotes in Table 6.

2nd Order Themes	Illustrative 1st Order Data
Actionable Business Analytics	"I think the challenge in making this actionable is the key things, most of my challenges lie in the fact that we spend enormous amount of time developing dashboards pushing and aggregating information that I believe that is largely unused. If you ask for a dashboard with over 20 metrics on it and you want it daily - you also get into something called as analysis paralysis"
Performance Improvement	"We found out product costs were too high, when we put the system in place it showed that someone was using cotton instead of rayon. Cotton costs more than rayon. It's a valid raw material, they could put that in there, its' a valid alternative. What it showed was not only is that affecting your cost on this product, but it's also affecting your margins on this product. So if you will start using rayon like you should in the first place, it's going to improve the profitability."
Competitive Advantage	"My job is to develop a 3 to 5 year strategy, where we are now and where do we want to be? And how can data and analytics be used to make us relevant and be competitive?"
Regulatory Compliance	"Ethical usage of data is huge. We constantly have to remind people what not to do. In some cases it's as simple as; don't market to somebody that's under 18. For one of our banking customers, we had demographic data that had age, income, home ownership, presence of children, occupation and a others we put back on the CRM web page where they could look at that data before they called their customer and they had us turn it off because they were afraid that the end user would read this off to them, we've been looking in your window and we know the following about you."

Table 6. Illustrative quotes for impact due to Business Analytics

5. Limitations of the study

This research study does come with its share of limitations. It is paramount to address generalizability, which is as per Lee and Baskerville (2003) is the validity of a theory in a setting different from the one where it was empirically tested and confirmed. They clarified that the appropriate type of generalizability, not just statistical, should be applied to this particular type of study. The intention of this research study is not to achieve statistical validation, but rather to find patterns for the determination of theory building and to obtain a better comprehension of the main issues in its context. It is reasonable to assume that the insights gained from this emerging framework will direct future researchers to develop a more formal theory in this area. Large scale additional data collection over the next year will further sharpen the findings in this research study. This research study should be an enabler for a large scale analytical that examines the relationships among the factors for success and impact of Business Analytics. Finally, the current findings are based on informants who are entrepreneurs in different industries, and is not focused towards a particular industry.

6. Significance of the study

The increasing use of information technology within the business world has driven the development of huge and complex datasets for many organizational functions. Conventional database applications do not possess adequate capacity and proficiency to analyse such huge data and manage the decision-making requirements of emerging businesses or for entrepreneurs. Business Analytics has been perceived as the current solution for establishing a culture of evidence-based decision-making for entrepreneurs in their company for success. This study is significant in understanding the linking between Business Analytics, decision-making and entrepreneurship. This study analyses the benefits of adopting Business Analytics which spans across a variety of dimensions of entrepreneurship.

Driven by the notable ascent in investments made in technologies to facilitate Business Analytics and the stretching concerns over implementation of Business Analytics successfully, the primary goal of our research study paper is to examine how entrepreneurs operationalized their Business Analytics practices in their organizations. We report the results based on the grounded theory method of analytical study that is being carried out to understand how Business Analytics aids organizations operate the expanding complexity of data, actionable information, and handling business decisions. We have set out to identify the factors that influence and result from successful

implementation of Business Analytics by entrepreneurs. Our analysis so far has resulted in the emergence of a consolidated theoretical framework for the success and impact of Business Analytics. Business Analytics is indeed playing a big and important role in the decision making process of an entrepreneur, and as deployments in Business Analytics become more successful, organizations will see more opportunity to increase its business impact.

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