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Appendix A

Research Survey

We are conducting a study to determine various factors that influence the maturity of Business Intelligence and Analytics (BI&A) in organizations. Following is a questionnaire that is structured around BI&A practice. This is part of a larger study for doctoral thesis on identifying BI&A maturity level of an organization and identifying the critical success factors.

It will be great if you can kindly respond based on your knowledge and current working status of BI&A in your organization. Please ensure that you respond to every question. There is no right or wrong answer. Your answers will be used only for research. We will maintain strict confidentiality about your identity. It should take you around 22-27 minutes to complete the questionnaire. Your response is highly appreciated and extremely valuable for the study. If you are interested in the analysis of this study, we would be happy to share a brief report about it.

A. Please respond to the following questions related to the state of Business Intelligence & Analytics (BI&A) in your organization.

1. What is the organization structure for BI&A?

    a. Part of IT collaborating with each business unit

    b. Independent unit / Centre of Excellence

    c. Embedded within each business unit

    d. Adhoc usage - no structure

2. How is the BI&A team structured in your organization? Select all which apply.

    a. No dedicated resources

    b. At least one full time analyst

    c. Multidisciplinary team – single manager

    d. Experienced empowered business users

    e. Functional information team collaborates between users and developers

3. Which functions in your organization use BI&A for driving decisions. (Select all that apply)

a. Marketing	b. Procurement
c. Customer Relationship	d. Projects
e. Supplier relationship	f. Finance
g. Supply chain	h. Human Resources
i. Inventory management	j. Information Management
k. Production	l. Risk Management
m. Sales	n. Any other _____

4. Is your organization using Big Data for decision making? YES/NO

5. Is your organization spending new or additional funding for Business Intelligence and Analytics each year? YES / NO. If YES, what % of the annual IT budget is allocated for BI&A? _____

6. Do you consider your company a high performance company (e.g., achieves financial and non-financial results that are better than those of its peers)?

    a. Yes

    b. No

    c. Not sure

    d. Don't know

7. Any additional comment or challenge about the state of BI&A in your organization

_____

B. **Please respond to the following questions related to the BI&A strategic alignment in your organization. Use the scale provided below each statement to reflect your view**

(BI&A strategic alignment refers to robust consistency in thoughts, plans and action initiated in respect of IT organization and processes, IT strategy, IT infrastructure, fully committed

to and in tune with the requirements to meet the business goals and objectives stemming out of the business strategy)

8. My organization has an overall strategy & vision for BI&A

Strongly Disagree	Disagree	Neutral/Not sure	Agree	Strongly Agree

9. There is a strong cohesion and alignment between the business, IT and BI&A strategy in my organization.

Strongly Disagree	Disagree	Neutral/Not sure	Agree	Strongly Agree

10. The processes which are targeted for using BI&A in my organization are as follows:

Tick all that apply
Processes which have some decent data and sponsorship
Processes which are already analytically oriented
Process which are cross functional involving more business people
Processes with a focus on strategic initiatives and value creation
All the business processes to make business decisions.

11. My organization engages strongly with business stakeholders for developing BI&A strategy.

Strongly Disagree	Disagree	Neutral/Not sure	Agree	Strongly Agree

12. We have a strategy in place to select appropriate analytical opportunities based upon available resources and requirements of the organization

Strongly Disagree	Disagree	Neutral/Not sure	Agree	Strongly Agree

13. Big Data initiatives are sponsored by top management and aligned at all levels with the overall organizational strategy

Strongly Disagree	Disagree	Neutral/Not sure	Agree	Strongly Agree

14. Big Data is used in the organizational, operational and decision-making processes to achieve the business strategy.

Never	Rarely	Sometimes	Very often	Always

15. Executives in my organization perceive the purpose of BI&A environment as:

    a. Operational cost centre – An IT system needed to run the business

    b. Tactical resource - Tools to assist decision making

    c. Mission-critical resource - A system that is critical to running business operations

    d. Strategic resource – Key to achieving performance objectives and goals

    e. Competitive differentiator – Key to gaining or keeping customers and/or market share.

16. Indicate some benefits of using BI&A in your organization

    a. Better access to data

    b. Better informed decision making

    c. Improved efficiency of internal processes

    d. Increased employee productivity

    e. Improved customer service

    f. Reduced operational costs

    g. Reduction of lost sales

    h. Transparency of information

    i. New way of doing business

    j. Enhanced profit margin

    k. Increased Return on Investment (ROI)

    l. Improved competitive advantage

    m. Any other _____

17. Any additional comment or challenge about the BI&A strategic alignment in your organization _____

C. Please respond to the following questions related to the Data Management in your organization. Use the scale provided below each statement to reflect your view

(Data management refers to management of data including master data and big data, architecture and governance processes in support of analytics)

18. Data in my organization maybe described as follows:

	Strongly Disagree	Disagree	Neutral/ Not sure	Agree	Strongly Agree
Data is of good quality and consistent across all departments					
All departments have a strong data orientation					
Usable data exists in functional and process silos					
We are working on identifying key data domains and creating central data repositories					
We have integrated, accurate, common data in a central warehouse/data lake with well-defined access for each function and process					
Business is considered the custodian of data					
Senior executives discuss data management					

19. The data quality used in each employee's day-to-day activities can be described as accurate, comprehensive, clear and consistent.

Strongly Disagree	Disagree	Neutral/Not sure	Agree	Strongly Agree

20. Data access in my organization is speedy, convenient, traceable, secure and current.

Strongly Disagree	Disagree	Neutral/Not sure	Agree	Strongly Agree

21. The structure of the data architecture in my organization can be described as:

	Strongly Disagree	Disagree	Neutral/ Not sure	Agree	Strongly Agree
Desktop data marts (e.g.: excel sheets)					
Multiple independent data marts					
A single, central DW with multiple data marts					

	Strongly Disagree	Disagree	Neutral/ Not sure	Agree	Strongly Agree
A virtual integrated DW or real-time DW					
Coexistence of data warehouse and data lake					

22. Master data management in my organization can be described as follows

	Strongly Disagree	Disagree	Neutral/Not sure	Agree	Strongly Agree
There are set procedures and implementation methods to manage the master data					
There are data management tools to support the capture, integration, and shared use of complete master data					
There is a defined data steward role for master data management					

23. People in my organization believe that the data used is of good quality and hence rely and use the various reports generated by the MIS/BI&A team.

Strongly Disagree	Disagree	Neutral/Not sure	Agree	Strongly Agree

24. The maturity of data management in my organization maybe indicated as follows:

1 Data is inconsistent, of poor quality and poorly organized	2	3	4	Data is integrated, accurate and accessible to everyone at all times

25. Any additional comment or challenge about the data management in your organization

_____

D. Please respond to the following questions related to the Enterprise level processes in your organization. Use the scale provided below each statement to reflect your view

(Enterprise level processes refer to process integration, standardization, coordination, penetration of analytics, functions of BI&A usage and IT resource management for BI&A across the enterprise)

26. Please mark the relevant option

	Strongly Disagree	Disagree	Neutral/ Not sure	Agree	Strongly Agree
BI&A is widespread in my organization across all business processes.					
BI&A is an integral part of the organization's culture and its decision making process.					
We have a cross-company BI&A facilitating team with clearly defined roles and responsibilities.					
We have mechanisms for managing the use of BI&A resources within my organization.					
We have well defined & documented processes for implementing change arising from BI&A.					
We have standard operating principles and SLAs in place to mediate between business decision makers and IT service providers.					
We have seamless processes across different organizational units.					

27. The standards that my organization implements for developing, testing and deploying BI&A functionalities can be described as (i.e.: ETL, BI and Big data applications)

No standards	Few standards in silos	Many standards in different business units	Standards across a few business units	Comprehensive set of standards across the organization

28. On the given scale, the maturity of enterprise processes in my organization can best be indicated as:

1 Islands of data, technology and expertise in the organization	2	3	4	5 Seamless processes across organizational units to manage key analytical data and resources

29. Any additional comment or challenge about the enterprise level processes in your organization _____

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E. Please respond to the following questions related to the Organizational Culture in your organization. Use the scale provided below each statement to reflect your view

(Organizational Culture refers to leadership support, mind-set of employees, techniques, applications, delivery methods, capability building, people thoughts and behaviour towards analytics)

30. Please give relevant answers to the state of organizational culture in your organization

	Strongly Disagree	Disagree	Neutral/ Not sure	Agree	Strongly Agree
Employees are familiar with using information, analytical frameworks and quantitative analysis.					
There are norms in the organization towards systematic use of gathering, analyzing and disseminating data.					
Those in leadership positions give a great deal of support towards building data literacy and the culture of pursuing BI&A across the organization.					
Top executives consider developing analytics capabilities as top priority.					
Big data is recognized as an important capability in my organization.					
My organization has the practices and culture to enable effective use of analytics.					

31. On the given scale, the analytical maturity of my organization can best be indicated as:

1 Low awareness or interest in BI&A	2	3	4	5 The mindset, techniques, applications, capability building, people skills and processes are all geared towards analytical culture

32. Any additional comment or challenge about the organizational culture in your organization _____

F. Please respond to the following questions related to the people skills for analytics in your organization. Use the scale provided below each statement to reflect your view.

(People skills refer to level of skills required for analytics, awareness and encouragement for picking up new skills, training and hiring)

33. The people skills in my organization can be best described as follows:

	Strongly Disagree	Disagree	Neutral/ Not sure	Agree	Strongly Agree
The level of knowledge, skills, and process abilities available for BI&A competencies in my organization are excellent.					
There is awareness and acceptance of the use of BI&A by employees to support their job/roles .					
Employees are encouraged to pick up new skills required for BI&A.					
Analytical employees are regularly recognized and appreciated.					
There is extensive focus on teaching, instructing, training and development of employee skills and capabilities for BI&A.					
Employees are aware of the potential of Big Data technology.					
Employees have required skills to make use of Big Data.					
My organization hires analytical minded employees in all business roles.					

34. The organization of professional analysts and data scientists in my organization maybe described like this:

	Strongly Disagree	Disagree	Neutral/ Not sure	Agree	Strongly Agree
There is cultivation of analytical amateurs across the enterprise					
Professional analysts are managed as a strategic workforce					
Highly capable analysts are explicitly recruited, developed and deployed					

35. The data analytics/ data science activities conducted in my organization can be best described as

1 Data analysis primarily using excel spread sheets	2	3	4	5 Use of Machine Learning/ Predictive/ Prescriptive Analytics

36. On the given scale, the maturity of people skills in my organization can best be indicated as:

1	2	3	4	5
Few skills attached to specific functions only				World class professional analysts and learning encouragement for amateur analysts as well

37. Any additional comment or challenge about the people skills in your organization

_____

G. Please respond to the following questions related to the Technology Infrastructure for analytics in your organization. Use the scale provided below each statement to reflect your view

(Technology Infrastructure refers to development and use of hardware, software, infrastructure and vendor management skills needed for data & analytics platforms)

38. Please select the relevant answers reflecting the state of the technology infrastructure in your organization

	Strongly Disagree	Disagree	Neutral/ Not sure	Agree	Strongly Agree
We have established technology for maintaining and expanding the data warehouse / data lake.					
We follow proven methods for managing, designing, developing & deploying BI that creates value.					
We have BI applications which improve business performance.					
The use of mobile devices, such as phones and tablets, for delivery of analytics is widespread in my organization.					
We have the technology and architecture for big data environment (E.g.: Azure Data Lake Store, a cloud-based storage platform designed for Big Data analytics, components like PIG, HIVE, Map Reduce).					
My organization has an advanced technology architecture which can support various analytics initiative. (E.g.: Real time data warehouse, data lake).					
There are standard physical facilities such as computer hardware, software, networks and communications that support all shared computing resources for analytics in my organization.					

	Strongly Disagree	Disagree	Neutral/ Not sure	Agree	Strongly Agree
My organization uses various advanced tools used to produce, analyze and deliver information.					
Employees in my organization have the necessary technology vendor management skills for data and analytics platforms.					

39. On the given scale, the maturity of technology infrastructure in my organization can

    best be indicated as:

1 Very basic technology infrastructure for reporting data and information	2	3	4	5 Advanced hardware, software and networks for big data, predictive and prescriptive modeling environments

40. Any additional comment or challenge about the technology infrastructure in your

    organization _____

H. Please complete the following biographical information. This will be used only for statistical purposes.

41. About your organization

    Organization name_____

    Location of organization _____

    Industry   _____

    Annual Turnover   _____

    Employee headcount _____

    BI&A practice in your organization since _____ (in years)

    Number of employees who are licensed users of a formal BI&A system _____

42. About you

    Designation _____ Department _____

    Total years of Experience _____

43. *Please tell us how you are associated with BI&A in your organization*

    a) Business user using BI to make business decisions

    b) Business analyst using tools for data exploration & visualization, report generation

    c) IT support person

    d) Data scientist working on predictive modelling and other algorithms

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Thank you for your cooperation

List of Publications

Journal Publications

- Divatia, A.S., Tikoria, J. and Lakdawala, S. (2020) 'Dimensions Influencing Business Intelligence and Analytics Maturity: A Critical Analysis', International Journal of Business Information Systems, Accepted and in Press (Scopus Indexed and ABDC listed) (DOI: 10.1504/IJBIS.2020.10024186).

- Divatia A.S., Tikoria J. and Lakdawala S. 'Emerging Trends and Impact of Business Intelligence & Analytics: Case Studies from India', Business Information Review, Accepted and in Press (Scopus Indexed)

Manuscripts submitted and under review:

- Divatia A.S., Tikoria J. and Lakdawala S. 'Measuring Business Intelligence & Analytics capability maturity: a study of organizations in India', (International Journal of Business Information Systems, Scopus Indexed and ABDC listed).

Paper presented/published at International Conference:

- Divatia A.S., Tikoria J. and Lakdawala S. (2017) 'Analysis of Maturity Models for Business Intelligence and Analytics", presented and published in conference proceedings of 2nd International Conference on Evidence Based Management (ICEBM) 2017 held at BITS Pilani – Pilani Campus on March 17-18, 2017.

- Divatia A.S. (2016) 'Factors influencing BI&A maturity in Indian Organizations", presented and abstract published in conference proceedings of SPJIMR - POMS India Chapter Conference, held at SPJIMR, Mumbai on July 29-30, 2016.

Brief Biography of Candidate

Aditi Divatia is an Associate Professor in the area of Information Management at S. P. Jain Institute of Management & Research (SPJIMR). Her areas of interest are Business Analytics, Text analytics, Big data and Enterprise Data management, Enterprise Architecture, Business Process Analysis and Change Management. She is certified in TOGAF Enterprise Architecture.

Her industry experience spans across six years in software development with Tata Unisys and as an independent consultant with CBIA, Pune in the area of Business Intelligence. She has 20 years of academic experience and has taught several courses like Enterprise Architecture with TOGAF, Strategic Business Process Analysis, Business Analytics, Business Analysis and Modelling, Business Ethics in IT, Data Structures, Management Information Systems, Systems Design and Object Oriented Analysis, Software Engineering, Database Management Systems, Object oriented Analysis, IT in Business.

Aditi has several publications in International Journals and conferences of repute, from this thesis. She has held leadership roles at SPJIMR in the Post Graduate Diploma in Information Technology (PGDIT), Post Graduate Diploma in Systems Management & Master in Information Technology with Virginia-Tech (PGDSM-MIT), Alumni Relations and is currently Associate Program Head – PGDM at SPJIMR.

Aditi is TOGAF certified and has received the Open Group award on behalf of SPJIMR for "Competency Development" as the main teaching faculty for TOGAF – The Open Group Architecture framework, in Feb 2017.

Brief Biography of Supervisor

Dr. Jyoti is a Ph.D from IIT Delhi and has completed her post-graduation from Kurukshetra University is Associate Professor in the area of Strategy & Entrepreneurship in Department of Management at BITS Pilani - Pilani Campus.

Her primary areas of interest in teaching and research are: Strategy & Entrepreneurship, Technology Management, R&D Management, Intellectual Property Rights Management and General Management.

She has over 45 publications in journals and conferences of repute. She has been involved in several R&D projects sponsored by Government, ICSSR and BITS Pilani. Dr Jyoti is currently Head of the Management Department at BITS Pilani.

Brief Biography of Co-Supervisor

Dr. Sunil Lakdawala is a Ph.D from Yale University, U.S.A. and Post Graduate from I.I.T., Mumbai. He has over 18 years of experience in Training & Consulting in Data Warehousing, Data Analysis ((Data Mining, Forecasting, OLAP), and Quantitative Techniques & Business Statistics. He is an Approved Ph.D Thesis supervisor of Birla Institute of Technology and Science, Pilani. He is a Visiting professor at various prestigious institutes (e.g. S P Jain Institute of Management and Research, SCMHRD, etc.) and faculty at various public programs Initiated Management Development Program for working executives.

Dr Lakdawala has 20 years of experience in the IT Industry - Setting up and managing large software product group (top 3 in the segment world-wide) as a profit center, with 120+ Marketing Executives, Project Managers, Software Engineers and Quality Manager. He has been instrumental in setting up and managing Quality practice group with 10+ quality executives, managing Projects with varied technology (Internet, Client-Server, Main Frame), customers (USA, Europe [UK, Germany], Middle-east, Asia (India, Malaysia)], and methodology. He has been involved in all phases of software development life cycle. Marketing Support. He is member of SEPG, Assessment Team Member P-CMM, Domain: Logistics (Ports & Cargo).

He has recently started a company in area of Remote Patient Monitoring system at SINE, IIT Bombay.