

An exploratory study of how Analytics-as-a Service (AaaS)facilitates value creation

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1.0 Abstract

Purpose – The purpose of this paper is to examine how Analytics as a Service (AaaS) a new type of software service used by SMEs is generating value to these businesses. This is one of the first studies looking into this spectrum from an end user i.e. the businesses' perspective.

Methodology approach – Case Studies: two semi-structured interviews were conducted to collect data from analytics experts of SMEs in Germany and the Netherlands. The data were analysed by thematic approach by coding both the participants and relevant themes were generated which then in turn helped answering the original research question.

Findings – Managers/owners in SMEs observe value creation out of AaaS applications that they use. Most value is seen to be generated in improving the process within the organisation. The organisation itself see some improvements and momentum towards a more data enabled decision making culture. However, finding the right people with right skills to make the most of these tools is still a hurdle

Research limitations – Limited number of interviews due limited data access. This paper only studies SMEs, large scale businesses might not have the same challenges that SME's face. Also, this paper does not look into how this value can in turn be bought back to the data generation, data gathering phase and help improve the very beginning of the analytics capabilities process of a business.

Keywords – Analytics as a Service (AaaS), Business value (BV), Business Analytics (BA), SMEs, Information Systems (IS)

2.0 Introduction

The dynamic environment in which business organisations operates has seen a boom in technological advancements Over the past two decades, businesses have moved from having in house resources to partnering up with external vendors. In a sense, outsourcing has become more widespread and is not only limited to outsourcing of customer support/call centre. Businesses have embraced the cloud delivery model of various services it used which are provided by external vendors. Business have seen the boom or usage of big data tools and applications and seen its usage leaving the doors of large corporations and being embraces by small and medium enterprises.

Businesses are witnessing the ever so growing advancement of business analytics tools that has brought powerful instruments of analysing data to their hands. In 21st century, every business, weather they realise or not, are generating some sort of data, either internally or externally. Leading researchers in the field of data science argue that if a business in today's world wants to stay relevant, it has to embrace its data and not be afraid of it. And with business analytics tools being ever so more accessible and affordable, thanks to the cloud delivery model – if you do not use your data, then the competition will use this chance to outgrow and expand.

Organizations invest in business analytics in the pursuit of competitive advantage or, if they are not-for-profit organizations, to help them find ways to achieve their goals more effectively or with fewer re- sources. To achieve these benefits, managers need to have a clear understanding of how an organization's business analytics capabilities actually influence organizational performance and in turn are a source of value creation (Seddon, Constantinidis, Tamm, & Dod, 2016)

One of the leading delivery methods of cloud computing is "Software as a Service" (SaaS) which essentially means delivering of software in form of a service on demand via cloud. This paper aims to look into a new and upcoming variant of SaaS, <u>Analytics-as-a-service (AaaS)</u>. AaaS sometimes also referred to as agile analytics, which means converting utility computing into a service-based model for analytics purpose. The small and medium businesses are the main users of this service as it a fairly cheaper

option compared to buying on premise expensive data analytics tools and applications. This paper looks how the users of such AaaS tools are using them, which areas of the bossiness are getting most benefit out of it and where there remains some work to be done.

The paper reviews a vast extension of literature starting from research on business value of information technology (IT), business value of business analytics (BA), what is cloud computing and finally what does it mean to be analytics in cloud. It uses a business analytics capability framework and adapts it to use for the purpose of this study.

As the topic of research is fairly new, this paper takes form of an exploratory research paper looking to expands academia's knowledge of what "Analytics as a Service" is and how businesses are using it. The data is collected in firm of semi structured interviews with two e-commerce businesses across Europe mainly selling furniture to end customers.

The results, with the help of the framework, shows us that the business process receive the most value out of these AaaS tools, the organisational pillar also sees added value out of it while the people pillar is where least value is generated. Although, AaaS tools are a great added support, there still needs to be work done for an organisational to truly become a data-enabled decision-making business. The findings are divided into various dimensions for each of the three pillars. The paper then puts forwards its theoretical and managerial implications followed by the suggestions for future research by taking in account the limitations of the current study.

This paper is one of the first studies which looks into the use of 'as-a-service' tools for an end user point of view - as most previous studies only talks until the adoption phase and not about what happens post-adoption - which is very important as the findings of this paper can be used as a feedback on the providers of such Software as a service tools.

3.0 Literature Review

This section dwells on the discussion and findings in the available literature the researcher gathered for the purpose of this paper. The literature review presented synthesises information in academic literature into summary, critically analyses the information gathered by identifying gaps in current knowledge, limitations of current theories, all of which leads to the research question of this paper. The structure of this literature review is as follows: Section 3.1 - Business Value and Business Analytics, Section 3.2 – Business Value Studies in Information Technology, Section 3.3 - Business Value Studies in Business Analytics, Section 3.4 – The Cloud and Section 3.5 – Analytics in Cloud

3.1 Business Value (BV) and Business Analytics (BA)

The Operational Research (OR) community has been in dilemma with the consideration of analytics being the sixth pillar of the dianoetic paradigm, distinguished by large volumes of heterogenous data that is complemented by the variety of tools for capturing, processing and visualising that data. (Mortenson, Doherty, & Robinson, 2015) suggests that the researcher's community should stop being ignorant and start addressing the challenges and opportunities put forward by data, big data, data analytics and different types of such analytics.

Data science, predictive analytics and big data, collectively referred as – DPB, by (Waller & Fawcett, 2013) is an increasing in importance for academics as well as researchers. Prior to 2013, there did not exist a research journal specific for the purpose of looking into bug data from an academic point of view, which changed that year with the premier of a new journal, *Big Data*. The research paper by (Vidgen et al., 2017) conducted a review of new journals and found that **fifteen new journals** have surface since 2013's Big Data Journal, including titles such as International Journal of Data Science, Open Journal of Big Data, Journal of Data Science, Big Data and Society, Big Data Research, International Journal of Business Analytics, and the Journal of Big Data.

Operational Research (OR) community needs to put their focus towards business analytics popularity in order to capitalise on the big data and analytics revolution and to be at the forefront of assisting practice with better theory concerning how businesses are to obtain value from these new and in-demand tools (Ranyard, Fildes, & IHu, 2015).

One of the core department of any business organisation is logistics and supply chain and in literature, the importance of DPB has been discussed with this regards i.e., logistics and supply chain management (LSCM). (Waller & Fawcett, 2013) argues that for organisations and academics in modern globalised economies, LSCM has grown in importance with its increased dependence on data for basic business transactions such as ordering, payment, tracking and tracing, etc. While (Hazen, Boone, & Ezel, 2014) discusses the relevant data quality at a more tactical level, from the perspective of DPB's current state, (Schoenherr & Pero, 2015)provides a holistic view and future potential of LSCM and proposed how to better visualize data through the use of semiotics for sense making.

But from an organisational perspective, things seem to remain unclear. Recapping on (Davenport, 2006), people in logistics departments, from managers to floor workers, have no clue on what analytics and big data mean, let alone how these tools and concepts carry a huge potential to offer value to them and the entire organisation. These themes of issues identified by LSCM cut across almost every department amongst multiple business industries. Following such discussions like this, it raises the question of value – what comprises value for a business organisation?

(Lindgreen, Hingley, Grant, & Morgan, 2012)argue that 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. This concept of value has grown in importance since there has been data boom in all business industries. (Kiron, 2011) support this hypothesis stating that businesses have to develop smart data management systems in order to make sense of increasing volume of data generated to address the need for not only value creation but also to achieve and sustain competitive advantage. A survey conducted by them in 2011

shows that 57% of the respondents noted their organizations were gaining competitive value from analytics, up from 37% in 2010.

To put things in perspective with help from an example – 2.5 petabytes of data per hour is being handled by Walmart across its global retail operations (Pandey, 2016). Within this, they face the issue of what data to store in the systems to conduct business analytics to extract value – as most data generated internally is unstructured, has high generating costs as well as data storage costs (Pape, 2016). Thus, the issue of value matrices continues to be of importance and a challenge to business organisations in an era of exploding data sources, particularly in tactical matters such as stock acquisition and inventory management of fast-moving consumer goods (Vidgena, Shawb, & Grantc, 2017).

Following on from that, (Lavalle, Lesser, Shockley, Hopkins, & Kruschwitz, 2011) highlights three capability levels in organizations to adopt and use analytics –

- 'aspirational' justifies actions
- 'experienced' guides actions, and
- 'transformed' prescribes actions.

For a business organisation to move towards reach the phase of "transformed" – the organisation's dynamic capabilities - the capacity of an organization to proactively create, extend or modify its resource base (Penrose, 1995), coupled with analytics enabled customer relationship management (CRM) capabilities – will have to be at the forefront of creating business value and sustained competitive advantage, which have to be embedded into the culture and processes of a business organisation over time (Shanks & Bekmamedova, 2012).

3.2 Business Value Studies in Information Technology (IT)

Perhaps one of the most sought-after research area for 21st century academia has been to look into "Business value of IT". In the organization-centric pre-Internet era, the IT BV research was based on the perspectives of internal business processes, organizational structure, and workplace practices (Krishnamoorthi & Mathew, 2018). There exist multiple studies in literature addressing the pain point of IT investment value by using the concepts of organisation theory and business strategy. Many different theoretical frameworks have been devised by researchers to analyse the value of IT for businesses, including - theories in industrial organisation, microeconomics, organisational behaviour and business strategy realms (citation* 2). Other common practice identified is the use of Resource Based View (RBV) of a business organisation as a conceptual framework in order to analyse the value of businesses' IT investments. RBV theory is based on the ideas that firms comprise a bundle of resources, and the more valuable, rare, not limitable, and difficult to substitute they are, the higher is the impact on the firm's competitive advantage and performance (Krishnamoorthi & Mathew, 2018) and therefore, is often the framework of choice when researching on topics focusing on linking business strategy and performance, obtaining sustained competitive advantage by creating IT capability. For such reasons, Resource Based View (RBV) is often considered as the primary theory in the context of looking into a new resource acquired by a firm, as it combines the rationale of economics with a management perspective (Krishnamoorthi & Mathew, 2018).

Managerial IT skills is the only attribute that has the possibility of providing sustained competitive advantage out of all the attributes of RBV, namely capital requirements, proprietary technology, technical IT skills, and managerial IT skills, put forward by (Mata, Fuerst, & Barney, 1995). A study conducted by (Bharadwaj, 2000) states that business organisations should focus on creating an organisation-wide capability rather than just merely investing in IT, this notion is supported by other studies stating that IT investments have a positive relationship with firm performance measured via ratios such as return on investment (RoI), return on assets and return on sales.

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However, determining the IT business value is still surrounded by fuzziness. IT value has been widely underrepresented by under-researching the intangible value, which stresses on the importance of looking into these intangible aspects of economic value of IT (Kohli & Grover, 2008). Thus, creating IT capability is complex and requires time and effort, and the underlying mechanisms through which it is created are not clear (Krishnamoorthi & Mathew, 2018). Despite that business value of IT is one of the widely researched topics, gaps remain in terms of the ambiguity and fuzziness of business value of business analytics (BA) construct, different types of BA and the value creation process.

Although a review of IT's business value studies is a good starting point in order to understand the business value of business analytics (BA), some characteristics of business value of business analytics – such as implementation techniques, managerial challenges – might not be the same. Hence, using the same frameworks of IT business value to business analytics business value might not be a fair deal. Mentioned below are some of the reasons for this argument (Krishnamoorthi & Mathew, 2018):

- Business analytics focuses on exploration of data rather than just focusing on deployment of technologies, which is the case for most IT systems i.e., IT mostly brings business value by process standardization and harmonised integration while business analytics is more enterprise wide in an evolutionary nature, it constantly thrives to improve processes and integration and managerial actions platys a big role in its success.
- Conventional IT projects and systems have the aim of defining tasks and have pre-defined outcomes and usually follows a very rigid, step by step structure. On the contrary, business analytics projects usually come into existence with a question that needs answering, answering that the data might hold and it is done by developing hypotheses, using a iterative approach until a best possible understanding and subsequent outcome is reached.

 The core and only goal of traditional IT systems is to either reduce costs or increase revenues where business analytics systems are more about evolving the businesses' thinking in the long run and manipulating the data (which every business today inevitably generates) for smarter operational and strategic decisions, challenging the intuition led assumptions and decisions and brining more concrete reasoning to the table.

While the IT and business analytics systems and projects differ so much in the way they are deployed and used and benefits harvested, it is becoming increasingly clear that measures of business value of IT and business analytics depend on what is meant by them , and any business value research should theorize about the specific technology under investigation including their capabilities and context (Melville, Kraemer, & Gurbaxani, 2004).

Next, we look into the literature available regarding business analytics from the lens of business value. Studies regarding business value of business analytics is not as in abundance as business value of IT. Still, they cover a good amount of ground in explaining how and what are analytics capabilities and how they can bring value to the businesses. At the end of this section, there is mentioned a framework which will form the basis of our adapted framework (Section 3.5) which this research paper uses.

3.3 Business Value Studies in Business Analytics

The value creation metrices and processes are different for various technologies, therefore it is necessary to understand the unique mechanisms in context of value creation by BA. Upon scraping through existing literature, it was notices that studies on business value of business Analytics (BA) are scarce. A framework put forward by (Gupta & George, 2016)suggests that Data Analytics capabilities leads to superior firm performance, which aligns with the concept that maximisation of business value can be achieved using business practices that results in faster insights as a result of pervasive usage of BA across the organisation. (Shanks & Bekmamedova, Achieving benefits with business analytics systems: an evolutionary process perspective, 2012)argued that dynamic and operational BA capabilities lead to BV and improved competitive advantage.

(Chian Tan, Guo, Cahalane, & Cheng, 2016) argues that organizations need to facilitate the interplay and develop interrelationships between firm's capabilities in order to become analytically capable. And to measure such improved capabilities performance, the metrices ranges from decision making effectiveness to a complex metric comprising financial perspective, customer/ market perspective, process capabilities perspective, and learning and growth perspective (Bronzoa, et al., 2013). One example by (Chae, Olson, & Sheu, 2014) is that used five performance-related measurements: order fulfilment, delivery as promised, delivery flexibility, flexibility to change product mix, and flexibility to change output volume.

When we look at business value of busines analytics through a resource Based View (RBV) scope, literature suggests that business value results from intermediate process level impact, which aligns with several authors stating that there is an an intermediate (operational) process level perspective of value creation, with such value creation stemming from RBV capabilities such as production or service delivery methods, administrative processes, resource flows, knowledge management, and logistical streams (Rodrigues, Ruivo, & Oliveira, 2021).

(McAfee & Brynjolfsson, 2012)identify five challenges for organizations in becoming data-driven: leadership, talent management, technology, decision-making, and company culture. This shows that analytics is not clearly just a technical matter, which loops back to the arguments of (Krishnamoorthi & Mathew, 2018). (Nerur, Mahapatra, & Mangalaraj, 2005) explored the organizational change implications of the migration from traditional software (IT) to agile software (BA) using a model with four dimensions: (1) organization and management, (2) people, (3) process, and (4) technology.



Figure 1: Business Analytics Capability Framework (Vidgena, Shawb, & Grantc, 2017)

This model has a long and distinguished provenance in socio-technical systems and (Leavitt, 1965) diamond model of organization. This research paper will use an adaptation of this above-mentioned framework to tackle the research question. Both adapted framework and research question are presented later at end of <u>Section 3.5</u>.

On the other hand, the business model concept has also been considered as a conceptual alignment layer that allows translating the business strategy into business processes, especially as these are nowadays more IT-enabled, and the success of an organization is highly dependent on a successful relationship between business strategy and business processes along with the IS (Rodrigues, Ruivo, & Oliveira, 2021).

Some research papers mentions that the business model of an organisation can be a factor for generating business value at a process level. The paper by (Rodrigues, Ruivo, & Oliveira, 2021) claims that value creation intermediate process level caused by capabilities of SaaS EA is mostly felt in indirect increase of profits, process quality that, for a given price (or lower prices, allowed by cost efficiencies), give the possibility to increase sales but are not the direct cause for more profits.

Some researchers state that "firm capabilities" are among the primary drivers of economic value in a business organization. Additionally, the usage of EA is frequently associated with the creation of immediate-process level impact in the organization, also known as operational benefits which in turn can be referred to as "business value" whereas many researchers associate firm performance to strategic benefits (Rodrigues, Ruivo, & Oliveira, 2021). Another paper claims that business analytics is a great tool helping business to overcome and keep up to speed with the challenges of current dynamic business environment as BA has a positive influence on processes performances of a business entity.

When we talk about competitive advantage, the nuances are tricky to be noticed. If we consider two different business firms in the same industry investing in comparable analytics resources, the impact derived out of such analytics is rarely similar, let alone identical. Firms develop and deploy heterogeneous IT resources, a combination of IT assets and capabilities, on the basis of investment allocations and organizational differences, which explain variation in firm performance and attaining competitive advantage between organizations which invests in similar assets (Rodrigues, Ruivo, & Oliveira, 2021).

This research paper looks into model that examines the effects on business value an organisation can experience, if one of the element within the framework is elevated. In this case, the elevated element is the technology part via **Analytics-as-a Service** *(AaaS).*

3.4 The Cloud

The term cloud or cloud computing has been one of the most discussed topics in the last two decades. According to a study by the International Data Group, 69% of businesses are already using cloud technology in some capacity or another, and 18% say they plan to implement cloud-computing solutions at some point. Similarly, Dell reports that companies that invest in big data, cloud, mobility, and security enjoy up to 53% faster revenue growth than their competitors (SalesForce, 2013).Researchers argue that the observing the current trends and where the current world-wide industries are heading, it is the best time for a business to throw in its hat in the cloud game. Businesses are not only realising the benefits of cloud computing (discussed in detail below) but also are using the technology to run more efficient organisations and drastically improving their profit margins.

While the concept and applications of cloud competing has existed as early as the beginning of the internet, it has only recently that the idea has gained momentum. Various researchers and companies have attempted to define the meaning of cloud computing. National Institute of Standards and Technology defines cloud computing as - Cloud computing represents an IT service model and a kind of platform which provides on demand IT services over the internet (NIST, 2011). With the exponential increase in data use that has accompanied society's transition into the digital 21st century, it is becoming more and more difficult for individuals and organizations to keep all of their vital information, programs, and systems up and running on in-house computer servers (SalesForce, 2013). Most people are using such applications on day-to-day basis on a personal level, applications such as Facebook, Instagram, Gmail, etc. are all hosted on cloud i.e., their user is sending its personal data which is being stores on a remote cloud hosted server available for later access. This benefit manifolds into several benefits when we talk about businesses being able to access their customer data from anywhere anytime.

In order to look into the architectural design of the cloud, the provided by National Institute of Standards and Technology (NIST) states that cloud computing consists of, three service/delivery models.

1. SasS (Software as a Service): This means delivering of software in form of a service on demand (example: salesforce.com – client Relationship Management (CRM) service, Gmail) i.e., "software that is deployed over the internet. The provider of such service licenses an application to the customers as service on demand, with the help of subscription, usually in a "pay-as-you-go" revenue model. Some defining characteristics of SaaS include (Bhadoria, Chaudhari, Tomar, & Singh, 2017):

- Web access to commercial software.
- Software is managed from a central location.
- Software delivered in a "one to many" model.
- Users are not required to handle the software upgrades and the patches.
- Through application Programming Interfaces (APIs) we can integrate different pieces of software.

2. PaaS (Platform as a Service): PaaS is basically a computing platform that allows us to create the web applications in simple manner without any complexity of buying and maintaining the software and infrastructure. PaaS is analogous to SaaS except that, beinga software delivered over the web, it is a platform for the creation of software, which is delivered over the web. Examples such as : Amazon Web Service (AWS), Microsoft Azure. Some defining characteristics of PaaS include (Bhadoria, Chaudhari, Tomar, & Singh, 2017):

- Services to develop, test, deploy, host and maintain applications in the same integrated development environment. These varying services need to fulfill the application development process.
- Web based user interface creation tools help to create, modify, test and deploy different UI scenarios.
- Multi-tenant architecture where multiple concurrent users utilize the same development application.
- Built in scalability of deployed software including load balancing and failover.
- Integration with web services and databases via common standards.
- Provide support for the development team collaboration.
- Tools to handle billing and subscription management.

3. IaaS (Infrastructure as a Service): Infrastructure as a Service is a kind of technique which provides servers as a infrastructure, storage as infrastructure, network and operating systems as on-demand service. Without purchasing servers, software, datacenter space or equipment related to network, clients buy these resources as a service as per demand with the help of IaaS. Example such as: Amazon Elastic figure Cloud (EC2) which offers virtual computers for renters to run their business applications. Some defining characteristics of PaaS include (Bhadoria, Chaudhari, Tomar, & Singh, 2017):

- Resources are distributed as a service.
- Allows for dynamic scaling.
- Has a variable cost, utility pricing model.
- Generally includes multiple users on a single piece of hardware.



Figure 2: Three Delivery Methods of Cloud Computing

Before cloud, businesses hosted important data on in house servers and the information used to float around through communications channels known as Enterprise Service Bus (ESB). The concept was first introduced by Gartner in 2002 which defined ESB as - an approach of integration architecture which allows communication via common communication bus that consists of variety of point-to-point connections between the providers and the users of services and an architectural pattern which enables interoperability among heterogeneous environments, using service orientation.

Unlike ESB, Unlike ESB, Lack of high level of integration capability has prohibited cloud computing from being a wide adopted service platform. Due to the high risk and complexity within the integration of cloud-to-on-premises and cloud to cloud systems, maximum cloud computing services (i.e., SaaS) presently are not allowed to general applications and standalone services and applications (Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011). Most clients of SaaS clouds are SMEs (Small and Medium Enterprises) as a result of their business processes tend to be more usually shared and comparatively easier than those in massive firms. in addition, "having abundant less of legacy IS infrastructure to contend with, it'll even be much easier for SMEs to move to the cloud (and in several cases, the cloud could be the primary instance once they strive a new practicality, e.g., ERP, As the normal alternative would have been too costly at the initial place)" (Marston, Li, Bandyopadhyay, Zhang, & Ghalsasi, 2011).

There is an increasing trend to adopt enterprise applications in the software-as-aservice model. The trend is in line with the expected growth of the worldwide market for cloud software (considered as Software as a Service (SaaS) and Platform as a Service (PaaS) (Bommadevara, Miglio, & Jansen, 2018). However, literature on such is limited or often do not cover the topics with a greater business sense in mind.

The majority of relevant studies in IT-based business value research either about the impact of more generic IT systems or enterprise applications. Even in cloud computing, they do not make a clear distinction between business value and strategic benefits, except for some rare exceptions, which makes it often common to find research work citing the impact of firm capabilities supported by IT in firm performance, without delineating that distinction and marking the dependency among the two types of benefits, that is, "business value" and "firm performance." (Rodrigues, Ruivo, & Oliveira, 2021)

A paper put forward by McKinsey highlights that many firms struggle going "all cloud" because they are not taking this approach as part of a holistic strategy (Bommadevara, Miglio, & Jansen, 2018). To date, most implementations and usage of enterprise applications hosted at a third-party data centre, usually as a "pay per use" model through a monthly fees depending on the number of the users and functionalities. Because of the benefits mentioned in this paper under section "IT-based business

value and SaaS EA" – it was concluded that adoption and usage of SaaS EA should reflect better support to the capabilities of the enterprises, and consequently lead to increased business value and firm performance.

Coming back to process level impact, several authors agree that at process level, the perspective of value creation i.e., the relationship between the performance of business. processes and the business model - is a result of firm capabilities which has effects on items such as customer service, product/service delivery methods, administrative process and knowledge management.

Organizations are integrating cloud applications in their business processes in the short run however, the usage of such applications remains limited in the long run. This is in line with the McKinsey report where is dissects multiple reason as to why firms fail in successful implementation and adoption of cloud offerings. Moreover, "enterprise service customers with global operations need quicker response time, and therefore save time by distributing work requests to multiple Clouds in numerous locations at a similar time" (Buyya, ShinYeo, Venugopal, Broberg, & Brandic, 2009)

In the next section, we talk about a specific type of service delivered via cloud which has been gaining popularity in the business paradigm. We discuss analytics in cloud, more commonly known as "Analytics as a Service") and try to learn about its characteristics and different types. As this topic is relatively new, the researcher was unable to locate good secondary data in IS and IT research journals.

3.5 Analytics in Cloud

In the past few years, there has been an increasing trend and emergence of a new service taking advantages of the cloud computing. It is no surprise that almost every business organizations today uses some sort of analytics or data-based applications for bringing structure to departments, business planning, problem solving in form of dashboards, visuals or data informed reports. Considering the various benefits of cloud model, there is an increased demand for exploring cloud delivery model as a solution for business Analytics implementation challenges concerning hardware and software complexity and cost (Baars & Kemper, 2008). Apart from the reduced costs of implementation, there are several other factors which makes cloud services of business analytics enticing to businesses, particularly increased agility owning to the scalability of the cloud (Naous et al., 2017).

Forrester Research, said that soon there will be a trend where business intelligence (BI) and business analytics (BA) will see momentum shift towards being self-service, pervasive, social, scalable, cloud-based, and real-time. For the same, the term "Analytics as a Service" (AaaS) has been coined for cloud services in the analytics realm. Analytics- as-a-service (AaaS) sometimes also referred to as agile analytics, which means converting utility computing into a service-based model for analytics purpose (Ravia, Khandelwala, Krishnaa, & Ravia, 2018).

Analytics as a service (AaaS) is a less complex version of Big data Analytics as a Service (BAaaS) (Sun, Zou, & Strang, 2015), the latter being only available to large organisations. BAaaS means that a business organisation or information system has the ability to access a generic analytics platform in to shared utility for an enterprise with visualised analytic services. An analytics service is usually available on a handheld device such as a smartphone or on web. The usability on smartphones is rather limited due to limited screen real estate, hence the web is more common platform to access cloud analytic services, usually know as web analytics services (WAS). And to make such tools more accessible to small and medium businesses (SMEs), Analytics as a service (AaaS) is has emerged as a rapidly growing business sector of web analytics industry, which provides efficient web log analytic services for firm-level customers.

Another characteristic of AaaS is that it offers the benefit of economies of scale and scope by providing many virtual analytical applications with better scalability and higher cost savings. Cloud supported analytics solution should be able to analyse real-time events and help to analyse different types of data (Ravia, Khandelwala, Krishnaa, & Ravia, 2018). Service oriented analytical solution should not only be restricted to data or text mining problems, but it should be able to address the following type of problems too:

- Large Scale Optimisation
- Highly complex multi criteria decision making
- Distributes simulation network

One of the advantages of AaaS is that it is not restricted to a single database or software, rather AaaS based platform can share its utility for an enterprise which is focused on virtualization of analytical services (Demirkan & Delen, 2013). Most data produced by organisations is unstructured. While some of it can be structured using traditional simple tools (such as Microsoft Excel), most of it needs advanced analytics tools across enterprise as these tools' database architecture is designed to tackle vast amounts of structured as well as unstructured data – all with highest accuracy and within shortest time frame possible.

Companies like Amazon, Microsoft, eBay, Opera Solutions, etc. are already facilitating "analytics-as-a- service" model. For example, eBay employees access a virtual slice of the main data warehouse server, where they can store and analyse their datasets. The eBay's virtual private data marts have been quite successful. Hundreds of them have been created with 50–100 in operation at one time. They eliminated the company's need for new physical data marts that cost an estimated \$1 million apiece and require the full-time attention of several skilled employees to provision (Winter, 2008).

A Gartner's report suggest that business intelligence (BI) functionality used on a mobile device is usually backed by cloud-based services such as AaaS. AaaS can be a data mining or reporting application for business end-users as a software as a service (SaaS) offering, but also a platform as a service (PaaS) offering that provides

data scientists and developers with a data analysis suite or framework for their development (Bhadoria, Chaudhari, Tomar, & Singh, 2017). Thus, AaaS can be said as a combination of different such as visualisation, of data, self-service access of data, distributed storage and computation on cloud-based platforms.

In literature, several researchers have begun to explore the cloud analytics landscape using different perspectives. Two broad perspectives found in literature are:

- First Stream: proposes and pilots innovative cloud architectures and services as research prototypes
- Second Stream: analyses how different analytical application classes (BI, DSS, and big data) are migrating towards the cloud

First Stream

This stream suggests an architecture type of AaaS. It suggested AaaS as a platform explicitly designed as PaaS hat will be configured with several analytic systems to provide "on demand data storage and analytics services through customised user interfaces which will include query, decision management, and workflow design and execution services for different user groups" (Zulkernine, Martin, Zou, & Bauer, 2013)

Second Stream

This stream enlists the attempts of various researchers who have tried to develop scenarios and conceptual models of the AaaS landscape for diverse analytical application classes. For BI, (Baars & Kemper, 2008) developed a framework that can help one to identify, combine, and eventually evaluate potential BI services. According to them, there can be six different scenarios for BI in cloud. It can be composed of a combination of functional BIA blocks or independent components having diverse delivery models. However, these scenarios are not further validated in current literature.

Alternatively, (Demirkan & Delen, 2013) propose a conceptual framework for DSS in the cloud. They decouple AaaS with its data analytics and visualisation capabilities from data storage (data as a service) and data integration (information as a service). AaaS literature also suggests that there exist two primary user groups to which AaaS

is most appealing, namely – data experts and business users (Arun et al., 2015). Data experts could be data integrators or data scientists that deal with technical aspect of analytics systems concerning data acquisition, modelling, and workflow design. Business users are typically practitioners and managers who are more interested in the business value of analytics concerning query results, visualization, and collaboration (Naous, Schwarz, & Legner, 2017)

The current literature is super limited in terms integrating AaaS into specific business models. One paper attempts this and lists out five AaaS business model archetypes. Compared to the classification scheme, archetypes represent a typology. According to (Doty & Glick, 1994), typologies identify multiple ideal types, each of which represents a unique combination of the attributes. The table below shows these different archetypes with their respective business model characteristics and illustrate them with representative case studies.

					T
AaaS	Visualization as a service	Self-service AaaS	Analytics PaaS	Big data AaaS	Edge AaaS
Representative cloud services	Tableau Online	GoodData	SAP HANA Cloud Platform	Qubole Data Service	Predixion RIOT
Value proposition	Visualization Dashboards Mobile Collaboration Data integration	Visualization Dashboards Reporting Basic Predictive analytics Mobile Collaboration Data integration	 In-memory database Predictive analytics Advanced analytics Spatial analytics Text mining Data integration Development Application integration 	Predictive analytics Machine learning Hadoop/Spark Smart query Data integration Development Application integration	•Real-time analytics (IoT) •Advanced analytics •Predictive analytics •Data integration •Development
Customer Segments	·Business users	Business users Business analysts Data scientists	Data scientists Developers IT architects	Business analysts Data scientists Developers IT architects	Business users (industry-specific) Data scientists Developers
Customer Relationships	Training Webinars Support Customer portal	Blog Training Webinars Customer portal	·Blog ·Support ·Training	Blog Community Support Training	·Blog ·Library ·Support
Partnerships	Re-sellers Technology OEM	· Technology · OEM · Application development	Application development OEM SI	-Technology -SI	·Referral ·Resellers ·Technology ·OEM
Channel	Online Live demos Partners: OEM, resellers	Live demos Direct contact Partners: OEM	-Online -Trial -Direct contact	Online Trial Direct contact	Direct contact Partners: OEM, resellers, referral
Revenues	Per user		Per user Per storage	Per user Per computing hour	

Table 1: AaaS Archetypes with Representative Case Studies (Naous, Schwarz, &

Legner, 2017)

The table above suggests that the viability of traditional BIA solutions is not only limited to migrating infrastructure and algorithmic capabilities to the cloud, but much more than that. While the archetypes 'visualization as a service' and 'self-service AaaS focus on mostly descriptive and basic predictive capabilities targeting business users and analysts, they emphasize visualization and collaboration capabilities to support their user communities in sharing analytics results (Naous, Schwarz, & Legner, 2017). For the sake of scope of this research paper, we will only look into and thereby will briefly discuss, only – visualisation as a service and self-service analytics as a service.

Visualization as a service: This is perhaps the most used archetypes of AaaS amongst business users. Its target user groups are the people looking for visualising data and getting quick insights. It provides visualization (i.e., charts, graphics, and plots) and data discovery capabilities with basic reporting and usually, does not include creating or using analytics algorithms or models. There are some innovate offerings coming up which allows users to practice interactive reporting and in new contexts (e.g., digital boardrooms), new ways of visualization (e.g., map), and dashboards. This archetype also allows sharing f data facilitating collaboration, sharing insights among team members and groups, allows integration of data from various external sources and applications with the possibility of live connection to cloud data services. Some examples in this category are: Tableau Online, also Bime and Qlik Sense Cloud, which offer access to multiple data sources and interactive dashboards in a SaaS delivery model.

2) Self-service analytics as a service: In simpler terms, this type of "as a service" is an alternative solution for data warehousing. It offers analytics for business users and analysts who then have easy access to company data from multiple sources. Hence, they are enabled to perform basic predictive and descriptive analytical tasks including multidimensional reporting and statistical modelling. Usually, the players in this domain are the ones who leverage their established business intelligence (BI) knowledge to offer self-service analytics software on the cloud. Some known players are SAS and MicroStrategy. As mentioned earlier, for the purpose of this research we adapt the diamond framework and elevate the technology pillar i.e., replace it with AaaS, keeping all other pillars the same and try to observe how the elevation of technology element is affecting the other three pillars (people, process and organisation) and in turn is resulting into added business value.

Based on the value propositions mentioned in the table above and the key drivers in *Value Creation through BA framework, we derive out adapted framework:*



Figure 3 : Adapted Framework

The other three pillars have been greyed out; they will become active (be coloured) later on in the discussion section based on our result's analysis.

Accordingly, the research question that this paper will try to shed light on is the following

• How Analytics as a Service (AaaS) is delivering added value to a business organisation, if any?

We posit that the business analytics capability of an organization can be thought of as a mediator between the data the organization generates and accesses (internal and external) and the value the organization can leverage from that data through actions based on these analytics capabilities.

Hence, we look into the benefits that putting processes into cloud generate and the challenges that a business organisation faces in generating value from business analytics and see if Analytics as a Service (AaaS), which offers the power of business analytics but via cloud delivery model, is helping organisations overcoming some or all of these challenges.

The next chapter lays out the reasoning and argument of methodological choices made by the researcher for the purposed of this paper.

4.0 Methodology

This chapter discusses the methodology adopted for this research paper. The purpose is to justify the choices made by the researcher on why a particular type of methodology is being adopted to address the research questions. It also provides justification regarding the choice of primary data collection and its importance. As per the "research onion" developed by (Saunders, Lewis, Thornhill, & Bristow, 2016) a research must go through these named layers of the onion whilst framing an appropriate methodology enabling a coherence to the research design with a wellthought-out approach. Accordingly, the chapter starts with discussing research philosophies for the research paper, followed by a discussion on research design regarding the methodological choices, then the strategy used to collect the data and choice of technique for analysing the data. The last section discusses the various limitations faced by the researcher with the chosen research design.

Research Onion by has the following layers:

- Research Philosophy
- Research Approach
- Research Strategy
- Sampling Method
- Data Collection Method
- Data Analysis Method
- Limitations



Figure 4: The research onion (Saunders, Lewis, Thornhill, & Bristow, 2016)

4.1 Research Philosophy

At every stage during a research, the researcher makes numerous types of assumptions and these assumptions inevitability shapes how the research questions are being understood, the methods used and how the findings are being interpreted (Crotty, 1998). The term research philosophy can be defined as a system of beliefs and assumptions about the development of knowledge that a researcher adopts and is always influenced by practical considerations (Saunders, Lewis, Thornhill, & Bristow, 2016). Each philosophy is suites to achieve different things and it's not that is better than the other. Only if we have an understating of the taken for granted assumptions of the world, we can understand the assumption, evaluate their appropriateness and perhaps try to amend them. However, one of the main influences is the view on what knowledge I can be considered as acceptable (Saunders, Lewis, Thornhill, & Bristow, 2016). In the research spectrum, Ontology - referring to assumptions about the nature of reality and Epistemology - referring to the assumption about the knowledge that is

known to be true, what constitutes as acceptable knowledge (Burrell and Morgan, 1979) – are the two broad philosophical assumptions identified by Saunders. Out of the five research philosophies, namely – Positivism, Realism, Interpretivism, Postmodernism and Pragmatism, this research follows a rather positivist approach. Positivist philosophy takes a scientific stance and works on law-like generalisations. As argues by (Gill and Johnson, 2010), it is a very rigid and highly structured methodology with to improvise as per the situation. Realism follows a similar structure as positivism i.e., a realist follower will see and experience events only as per the underlying structures is reality that shapes the events (Saunders, Lewis, Thornhill, & Bristow, 2016). The issue/point is not that the research should be philosophically informed but how well we are able to reflect upon our own philosophical choices and defend them in relation to the alternatives we could have adopted. (Johnson and Clark, 2006)

The interpretivist theory emphasis that humans are different from physical phenomenon, their social words cannot be studied in the same way as physical phenomenon and therefore social sciences research needs to be different from natural sciences research rather than trying to emulate the latter (Saunders, Lewis, Thornhill, & Bristow, 2016). It is essential for the research to be relevant to the questions stated in literature review. Because of the nature and structure of this work, i.e., the combination of using an existing framework from literature to give structure to a rather new topic, an exploratory topic- In this study, the nature is more positivist.

4.2 Research approach

As per (Saunders, Lewis, Thornhill, & Bristow, 2016), three research approaches exist in business research: deduction, induction and abduction. The deductive theory, usually combined with the positivism philosophy, is scientific in nature and involves development of a theory which is then thoroughly testes through a series of propositions. The inductive approach analysis the data collected by the researcher and then formulate a theory based on it and permits alternative explanations to an existing theory. Abduction theory starts with the observation of a new fact and then works out a plausible theory to justify the fact (Van Maanen et al. 2007). Since multiple organisational theories are used in the analysis of the subject, it was essential to follow the induction approach, allowing for initial observations and measures, collection of data, formulation of a theory, and thus resulting in a development of a conclusion (Trochim and Donnelly, 2005).

4.3 Research Design

The next layer of the" research onion" is the research design which depicts how the researcher plans to answer the research questions. Generally, data collection is be done by either quantitative methods or qualitative methods. Sometimes a combination of both maybe used which is knows as mixed methods. Quantitative methods are generally associated with positivism and is used when the data is highly structured, usually numerical. Qualitative research methods, generally associated with interpretivist philosophy is used when the researcher needs to operate in a natural setting and the procedures may need to be altered as per the data collection phases progresses (Bansal and Corley, 2011). A qualitative research design is based on non-numeric data such as words, images, video clips, and other similar material and is more concentrated on observations that help to describe the reality and situations. For this research, mono methods of qualitative research are adopted as it allows researcher to gain in-depth understanding of the questions raised and in accordance with the data collection technique discussed in later sections of this chapter.

4.4 Research Strategy

The methodological link that a researcher establishes between the research questions and the methods to collect and analyse the data defines the research strategy of that research (Denzin and Lincoln, 2011). It is therefore a researcher's plan of action about answering research questions. (Saunders, Lewis, Thornhill, & Bristow, 2016) distinguishes them into the exploratory studies, descriptive studies, and explanatory studies, which in their turn are classified into the following strategies:

- Experiment.
- Survey.
- Archival research.
- Case study.
- Ethnography.
- Action research.
- Grounded theory.
- Narrative inquiry.

Exploratory studies are a good mean to gain insight about a topic of interest, new topics on which much research has not been done or a new angle and usually tends to be qualitative in nature. are those that are a new, not researched topic or a new angle, and tend to be qualitative in nature. Descriptive studies aim at gaining accurate profiles of persons, situations. In this study, it is necessary to have a clear picture of what phenomenon the researcher is looking before prior data collection. In the case of this research, it is of an exploratory viewpoint since Analytics as a Service (AaaS) is quite a novel phenomenon from literature point of view. At present there are not many studies on this topic and this work will attempt to explore reasons, ways, and success factors of this phenomenon. Case Study, therefore, is a process to analyse and explain the meanings that researchers construct to make sense observing and gathering information from the source. This research adopted the case study strategy. It opts for an inductive approach that uses qualitative data collection, since qualitative research usually results in rich detail and insights into participants' experience.

4.5 Sampling method

As already discussed above, the primary data collected for this research is through qualitative methods i.e., interviews. As this research paper is focused value creation for a business by using AaaS, it is more of a managerial decisions rather than picked up by employees, so having interviews with managers of analytics departments was a more suited way to collect data relevant to the research questions of this paper. As

statistical inferences need not to be drawn from the handful of people being interviewed to collect the primary data, non-probability sampling methods are used. Purposeful sampling method was used to recruit participants for this research. Purposive sampling is often used when working with very small samples such as a case study here and when the researcher believes that the selected sample is particularly more informative (Neuman, 2005). The participants are business owners who has dealing with e-commerce retail business for over 20 years and has recently made a few changes in his company's structure considering use of analytics in decision making processes. Both participants were male, contacted by either emails or mutual contacts who helped to arrange the interviews. The interviews were conducted online via Zoom and were conducted in English.

4.6 Data Collection Methods

The data collection process was iterative, following the recommendations of Walsham (1995). In order to get an overview of the usage of AaaS in SMEs and its contribution in value creation, primary data-collection technique was used. To collect primary data, two semi- structured online interviews were conducted. The interviews were held online as conducting face-to-face interviews was not possible because of travel restrictions and social gather restrictions in the light of COVID-19 pandemic outbreak worldwide.

The semi-structured interview encouraged discussion with the study participants. As previously mentions that the nature of this research is exploratory, semi-structed interviews made more sense. Semi structured interviews provide the opportunity to 'probe' answers where the researcher can ask the interviewee to further explain, build on, their responses. This may lead into an area that were not previously considered but can be proven helpful for the purpose of answering the research questions (Saunders, Lewis, Thornhill, & Bristow, 2016). Interviews consisted of four groups of questions: a first pool focusing on the general information about participants and companies, a second pool concerned with history and development of analytics team in the companies , a third focused on how analytics is being deployed currently, fourth discussing the usage and influence of AaaS in delivery further value for the businesses and the last part of interviews was focused on determining if the managers had a plan

of how they see the future of their companies with regards to business analytics. Although they consisted of 14 main questions, in some circumstances more questions were asked. The typical interview-guide is presented in <u>Appendix A</u>.

4.7 Analysis Method

Since meanings in qualitative research depends on social interpretation, it is likely to be more ambiguous, elastic and complex than quantitative data. This research paper will be using the Thematic approach to analyse the qualitative data. This approach offers a systematic yet flexible and accessible approach to analyse qualitative data (Braun and Clarke, 2006). In this approach, themes/patterns amongst the data collected is searched, identified and analysed. Data of similar meaning will be categorized and will be given a code. After that, relevant patterns/ themes will be searched, analysed and will use the adapted framework as a basis to classify the items

From the case studies the transcripts of the interviews were collated into a case protocol comprising 11,108 words. The case studies were coded and structured by us using the software NVIVO 1.0 (February 2020). This process resulted in a table of 3 items (codings) and with each case study analysed separately, reusing the coding and creating new ones where required. As mentioned above, when we did the encoding, we used the pillars of the framework to help categorise which relates to a more inductive approach, however the resulting dimensions are not based on any prior list of concepts, thus, the overall approach is more inductive approach in order to generate dimensions from the data.

Mapping of Case Study Data \rightarrow Items (Coding) \rightarrow Dimensions

Thematic analysis is the appropriate choice here because as co pared to other qualitative data analysis methods, it is more adaptable and flexible and as this research is based on case study, more flexibility only adds on to further explorations amongst research questions and unlike explanation building and template analysis, it is not a strategy that prescribes precise analytical procedures.

When the individual case studies were analysed using the NVIVO software, passages were identified and assigned to items, which were subsequently mapped to concepts (organisation, people, process). These concepts were then mapped to dimensions (e.g. – deep domain knowledge, tailor made, bricolage, etc.)

 Table 3 provides all the constructs along with the dimensions as outcome of the analyses of case



Figure 5: Research Design and Process
4.8 Limitations

The main limitation of this study is the limited research sample. Since the conduction of the interviews was carried out during global lockdowns (as a result of COVID-19 virus outbreak) many company managers were not interested in the idea of online interviews; some of the companies either refused to participate in the study or did not respond to emails. The author of this study was unable to carry out the original plan of conducting 4-5 case studies and thus was limited two only two case studies conducted online via Zoom meetings app.

The full details of interviews are shown in Appendix C. The other limitation was the unwillingness of participants to provide information. Some managers preferred not to answer particular questions because of a lack of information or confidentiality reasons. The researcher was unable to find rich secondary data on Analytics as a Service due to the novelty of this concept. Suggestions for overcoming some of these limitations is mentioned in <u>Section 9.0</u>

5.0 Results

This chapter will present the results collected for this research. As mentioned in the sampling section of methodology chapter, qualitative methods are used in this research paper to gather data from Analytics managers of small to medium scale companies. Head of Analytics departments are the key figures who could provide updated information regarding an organisation's journey and progress in the analytics realm. Both companies are online e-commerce retailers who mainly deal in furniture and other home furnishings.

This chapter includes the findings from online interviews conducted via Zoom from the period of late January to late February. As discussed in the ethical considerations' section of methodology, the identity of the participants will be kept confidential. Thus, the interview case study one will be referred as be referred as "**MobiCo**" and the interview from case study two will be referred as "**WizCo**".

5.1 Background of the companies

The companies selected for this research were both dealing in retail sector in their respective countries. As previously mentioned, companies from retail sector were chosen because usually e-commerce is a common practice amongst businesses dealing directly with end consumers. Both, MobiCo and WizCo. Both the interviews were with analytics experts of their respective businesses and had rich experience in running a business from their previous endeavours. The size of both the companies were small scale however we cannot say for sure they both of the managers refused to disclose their annual sales for confidentially reasons. Both the companies dealt in selling furniture and furnishings online. MobiCo is majorly a platform to sell furniture, it imports its goods from Asian countries like China, Vietnam and sell them on their website. A small amount of their sales comes from supplying furniture to other businesses (B 2 B) while most sales are generated via directly selling to the end customer. WizCo has similar import relationships and sell only to end consumer. Both companies' furniture on their website under their own brand name.

Both of the company's products included big furniture items like sideboards, couches, wardrobes ,etc. as well as small items like mirrors, garden chairs, etc. In the past few years, both companies have seen significant increase in use of several analytics tools in their organisations and have led to creating an analytics managers or go -t to person in almost every departments such as marketing, sales, supply chain, customer support, etc. The table below shows the summary of case study participants and their relevant roles along with company information

Construct	Role	Dimension(s)
MobiCo.	Analytics Expert	Chief Analytics Officer
WizCo.	Analytics Expert	Head of Analytics Department

Table 2: Background of the research participants

5.2 Data

As mentioned before, both MobiCo. and WizCo. were selected as they both deploy some form of analytics and AaaS based applications in their day-to day business operations. While MobiCo. Has always seen itself as a tech company more than a retail company - deploying analytics and becoming a data-driven decision-making organization, WizCo. Is starting to build its roots into the data driven culture.

Based on the framework mentioned at end of literature review, we analyse and classify the findings into different pillars of framework. The idea is to see which pillars – all, none or some – see improvement as a result of using an improved form of technology (AaaS). The diagram presented below shows this result.



Figure 6: Resulting Framework

As illustrated, the process pillar experiences the high improvement as a result of the organisations using AaaS, followed by medium to low improvement in the organisation pillar and low improvement in the people pillar. The overall result it increased value creation for the organit0n but there still remains work to do, improvements to be made. Based on the interview data and using the three pillars as a basis for classification, several dimensions within each pillar were identified and clustered together.

Construct	Dimension(s)
	Organisational Change Management
Organisation	Deep Domain Knowledge
	Senior management Commitment
	Explore & Exploit
Process	Tailor Made
	Self - Service
	Bricolage
People	Acquisition and Retention
	Efficiency Paradox

The table below shows these dimensions along with some extracts of comments, quotes from the case study interviews.

Table 3: List of Dimensions observed from Data Analysis

6.0 Analysis and Discussion

This section outlays the analysis of the results section. It presents six topics for discussion. First three sections discuss the relation and impact AaaS have had on the other three constructs namely: organisation, people and process. As mentioned in the results section, *process* pillar experiences most value creation after AaaS was introduced within the two case study organisations. *Organisation* pillar experiences subtle advancements towards added value creation while *people* pillar experiences little to no added value. Section four lays out the theoretical implications, summary of contributions made by this study to the field of journals relating business analytics. The next section (Section 7.0 and Section 8.0) about the theoretical implications and managerial implications of this study - summary of recommendations of guidelines a business manager should consider when optimising the business analytics capabilities of their organisation. <u>Section 9.0</u> discusses limitation of the current study and scope, suggestions for future research.

6.1 Organisation: Work needs to be done

(Seddon et al., 2010) argued that the key to achieving greater business value from business analytics is to have strong analytical leadership, adopt an enterprise-wide orientation, direct resources toward high-return targets, and embed evidence-based decision-making at organizational level. In an effort to define the primary attributes of analytical competitors, Davenport and Harris also identified a similar set of organizational-level variables for analytics strategy. By performing cross-case analysis, as part of identifying dimensions, the paper attempts to identify and classify such dimensions. The following table enlists the three dimensions identified in the organisation pillar:

Organisation		
Organisational Change Management	Need for a holistic cultural change throughout the organisation	
Deep Domain Knowledge	BA needs to possess a deep understanding of the organisation itself to be of value	
Senior management Commitment	When the leader sees data is an enabler for better business strategy, the organisation will see it too	

Table 4: List of Dimensions observed in Organisation Pillar

6.1.1 Deep Domain Knowledge

Achieving the business vision through analytics use means the organization views this aspect of its business as key differentiator from its competitors that makes it successful in the marketplace, achieved through extensive use of analytics. It is also possible that the business vision chosen by an organization may not be well supported by analytics initially.

but to increase the business and I think there's a good number where you can measure it, you can if you can make more order volume, from the customer service up to logistic by same employees, or you increase the employees, but for example, 20%, but you can make 50% more sales, that's a win - (**MobiCo**)

6.1.2 Senior management commitment

Senior management commitment to the use of analytics is the adoption of an enterprise-wide analytical approach to business, which requires significant changes in

culture, processes, behaviour, and skills for employees across the organization. Such changes must be led by senior executives with strong leadership and passion for analytics and fact-based decision-making.

With this experience of the first few years around data, collecting and evaluating data, we built up every department in our young company to meet measurement by data. - (MobiCo)

And by that, I mean growing profitably. Often the problem belongs directly in the evaluation of the data or, even worse, they do not know what data is available or they have not designed it to be machine-evaluable data. - (MobiCo)

6.1.3 Organizational Change Management

Organizational Change Management refers to management of people who are impacted by business analytics initiatives to accept and embrace technological and process changes. It also includes the provision of training to demonstrate the value and utility of new practices resulting from change, to encourage people to adopt them in their daily work, transforming the culture from ad-hoc decision-making to making decisions on the basis of data.

More data means more knowledge and more knowledge means being able to make faster and better decisions. We work every day to optimize our IT systems and data systems. - (MobiCo.)

We definitely see some improvements and advantages of using these tools. Everyone today is using some sort of analytics and we do not use it then we will fall behind. We are generating data, so it makes sense that we use it to improve our business and improve profitability. Our analytics team also look into different tools that we can use which might suit out needs better. I see big potential here - (WizCo)

As observed, the organisational pillar sees the effects of having greater access to analytical tools and they now have a clearer vision as to what needs to be done in order to truly incorporate data led decisions.

6.2 Process: The Winning Pillar

The next pillar in the framework is process. Based on both, single case and crosscase analysis, we find that the businesses have witnessed most positive results in this pillar. The following table enlists the three dimensions identified in the process pillar:

Process		
Explore & Exploit	Give analytics team the power to exploit more but also leave room for explore	
Tailor Made	Analytics could be tailor made, requiring in-house development to better fit the businesses' need	
Self - Service	Empower the customer and shift the responsibility of easy task to the customer	

Table 5: List of Dimensions observed in Process Pillar

6.2.1 Explore and Exploit

Process is something which can be ripped apart and broken down into individual steps. One can take these steps and observe them individually and see if one or more individual parts slowing things down as a whole. Analytics Officer at WizCo. multiple examples where they witnessed an opportunity to improve processes.

They use this information to say adapted not only for it for extra charge or whatever to say adapt it into real processes into real logistic process. sales. Sales, its foreign sales department. Yes. Okay. But takes this information, this data and put it into the logistic department. You see what happened? - (MobiCo.)

"new warehouse IT system where everything is automated and our logistics system

okay, and optimise the way for the forklift drivers to have shortest ways to the warehouse. And we have different types of forklifts." - (MobiCo.)

By making the movements of their forklifts trackable, they were able to device the shortest possible routes for their forklifts drivers in turn reducing the amount of time taken in order to deliver/move a package from point A to point B.

A lot of customer facing processes also saw major improvement. Processes such as : Online product sales (per Item / per Category) and compare with the past Profit rate from purchase to Sales Return rate of products Customer satisfaction per sales channel Growth per sales channel or growth per retail customer Speed of responses to customer questions (how many minutes from question to our reply) Order volume per employee (how to grow with more automation by same employee) -(MobiCo)

Response rate in answering support query, duration of customer calls and categories their issue into different categories and thus improving our FAQ section. Then there is this tool view use to monitor cart activity of the customer when they start adding products to the cart And of course, analysing what products are selling best at what part of the year and deciding our next purchase order from our suppliers accordingly - (WizCo)

The examples mentioned above states that optimisation of a process is possible when one is able to track the movement and interaction of multiple users involved in that process. By doing so, you see where, for example, a user is spending time in waiting for a response and if it is taking a longer time for a user to find a piece of information.

This is one of the ways where an organisation is able to bring value with analytics and is able to scale up without increasing the number of employees/paying out extra salaries, which in the eyes of **WizCo.** is true value delivered out of analytics.

Another value generated out of running analytics is finding incompetencies or chance for improvement in places which were never considered to be called a "broken process". One example given by **MobiCo**.

"How much piece are selling wood cannot store the item very close to the output area or far away. It helps us to improve our packing packaging capacity with round about 50 to 60%. than in the past" – (MobiCo.)

6.2.2 Self Service

In literature, the theory of consumer behaviour states that when the customers, when they get the feeling of being empowered i.e., when they are made able to perform certain activities on their own,

"we have own API's can share information with our customers need" we have created self-service tools for these small retail customers to have our time for the larger customers, who account for 80% of sales and 80% of growth. And we spend much time to expand the automation rate for these larger customers. - (MobiCo)

WizCo. also expressed the same notion. They think that they should have a portal whose users will be their customers. Here the customers will be able to tackle very manual tasks and maybe use technologies like AR to see the look and feel of furniture before actually buying.

6.2.3 Tailor Made

However, it is not a hundred percent win situation. Both cases depicted a similar shortcoming despite having experienced the benefits of AaaS. They outline that, although these tools are a great support in facilitating more data lead decisions rather than intuition lead, these services are manufactured for a larger audience – their purpose it. So, serve a general criteria of a problem rather than a specific use case of a problem in context of a specific busines organisation.

This often creates a mismatch, hence forces businesses to look for something more tailor-made or in this case, create an analytics solution of their own.

Should we generate this data for the future? And the systems go more and more intelligent and helps us do more? So, we spend a lot of money and time for our own system, which is perfectly fitting to our company. - (MobiCo)

We started with simple Excel lists in 2007. Then we added 3rd party tools as cloud solutions. Later we realized that these solutions could not provide all the data and reports – as well as automated actions - we needed and we started to develop our own software with our software engineering department, which covers all our processes and company areas. We invest a lot of money and time in our own cloud automation software. Even today we use external cloud analysis tools for certain areas (such as evaluating online advertising). - (MobiCo)

Every job today requires an orientation towards some technical skills and these skills and needs are to be constantly developed in order to stay up-do-date, in order to stay relevant. WizCo says:

Our processes are recreating every half year, we see new ideas, how we can handle it better, efficient, deliver a better customer service, or whatever. We will, we will adapt it for the future. And he started directing, never ending learning progress. -(WizCo)

Both case studies organisations were of the belief that if a business makes all its activities trackable my machine, it is possible to recognise and realise wasted resources which in turn could provide with an opportunity to bundle all the strength and energy and focus on eliminating this waste.

We have recognized that 80% of customers only make 20% of sales, but this 20% of sales take up 80% of our time and If you think about analysing business value, you can see that 20% of activities account for up to 80% of progress. - (MobiCo)

However, respondents were also aware of the problems that might lie with making everything trackable my machine and blinding acting upon those results. Think of an example: if you give an algorithm the command that it has to come up with the best possible mode of vehicular transpiration with three wheels, it might come up with something like a tricycle version vehicle after multiple iterations. But in this context, what it fails to do is to consider the possibility of have a vehicle with four wheels instead of three is even better. However, the data itself cannot do that, this is why it is important to complement the results out of the analytics software with human intuition and input.

6.3 People: Still a scarcity

The last pillar for discussion is people. Based on both, single case and cross-case analysis, we observe that people construct is the one least affected by a company's engagement with Analytics as a Service (AaaS). The following table enlists the three dimensions identified in the people pillar:

People		
Bricolage	Give analytics team the power to exploit more but also leave room for explore	
Acquisition and Retention	Analytics could be tailor made, requiring in-house development to better fit the businesses' need	
Efficiency Paradox	Improved process leading to free employee time should be invested in future business thinking	

Table 6: List of Dimensions observed in People Pillar

Finding the right talent is a crucial steps in the process of extracting value out of a new tool, the tools and techniques don't matter as much as the ability of the employees to cobble together solutions using the tools at hand.

6.3.1 Bricolage

The idea of becoming a more data informed business is becoming the holy grail with each passing day. This mix of technical and business knowledge is important when implementing business analytics systems (Davenport T. H., 2006). Both case studies

company's organisational structure showed a strong foothold in having a dedicated analytics manager for almost every department.

we are a young team (25-40 years) and we understand us not as a retail company but as a tech company, as you can see, every department have their own analytics manager. Retail Business, Purchase, Item content management, Sales, Customer satisfaction - (**MobiCo**.)

However, the core problem, finding right people, still remains at large. This comes back the concept of "employee bricolage" where that thing that matters most is the ability of employees to club together solutions and information using the tools at hand and it still remains a struggle for both organisations to find such a fit:

It is not so easy to find new employee with this mindset at our local area. Thinking and working with new technologies, if working with common technologies like you do it the last 10 or 20 years, and still problem now to find people who are willing to learn these skills and able to signals. – (MobiCo.)

It has been challenging in honesty. Although we started our business directly as an online commerce, our company is still very traditional working. The team, apart from analytics department, is used to the old way of doing things, structured way of doing things. – (WizCo.)

So, when the young team in analytics departments is taking time to run multiple versions of their reports so they can find the best report, it frustrates the other departments it causes them delay. - (WizCo.)

Organizational resources are driven by people and dealing with current skills shortages is very important in implementing BA systems, and facilitating effective IT and business partnerships (Luftman & Kempaiah, 2007). One behaviour observed at **WizCo.** was to tap the opportunity to hire more people than needed as this could lead to a potential of having more skilled labour than required and the resulting benefit is far greater than the risk of a bad hire.

You have to find people and to if you have one job. And if it's possible to get two people, which could be suitable for this job, hire two people. Okay. And one of one of these two people's you will see three months later. 10 is he or she is not good. So, cancel the contract. So, but if you tell me the question, what happened if both peoples are good? What are you doing them chequered? Perfect, and you have two very good people. You can grow with them. It's not a problem. I only looking for one person, which is good. - (MobiCo.)

6.3.2 Efficiency paradox

Another interesting perspective came into light with within the two cases. Acquiring the right people is one step out of several towards achieving a holistic data lead decisions. The next step, as per WizCo., is ensuing that the people are properly motivated to constantly keep investing their energy in effort in not just performing and using tools but also thinking about how it can be further improved. It was noticed that sometimes, as a result of efficient processes, employees end up having some free time in their hands (which was earlier occupied with performing less efficient process) and instead of thinking outside the box, thinking outside their job description about improving processes further, they end of doing nothing. We call it "efficiency paradox"

yeah, smarter processes give the person and the employees extended free time, by automation, and so on. And for this free time, you don't need less people. But the people you have, and hopefully, a good quality five people have more free time to do new interesting things. Push the business. - (MobiCo.)

That's it. And if you say, hey, if you make the new working process, I know, it's a hard work to do this. But when you have only six hours of work, yeah, but my time at work is eight hours. So, should I sit here and do nothing or no? Think about? What can we improve? can we do better than other companies? Which data do you have? And which data we have to collect? And to find new ideas? - (MobiCo.)

Dealing with such a problem is also related to the next dimension we mention i.e., acquisition and retention of skilled labour

6.3.3 Acquisition and Retention

Retention of employees is crucial as an organisation invests heavily in order to polish an employee where they fit well in the ways of working of the organisation. It takes time and effort to train the employee which understands the specific steps and processes of a business and acts accordingly. This comes back to the idea of custom tools development – just like a company needs to develop custom tools and techniques to better fit it's needs, it needs to train and groom new hires and existing employees in a specific way where they, together with the customer tools, becomes a powerful resource:

We have to train and educate our employees day by day. If we could find a person who is able to do this, we would hire them. Life is an ongoing learning process these days - much faster than it was 5 or 10 years ago. And the demands on technically knowledgeable employees will continue to increase in the upcoming years. – (MobiCo.)

The lack of analytic skills is one of the biggest problems. This cannot be solved immediately, as you have to build up the skills of the employee piece by piece and day by day. - (MobiCo.)

As a holistic view, an employee sees the company as a whole and this also relates back to how embedded an organisational leader is in instilling a data lead culture. The idea here to establish a vision where the employee performs their duties not to support and make their department a success, but to support and help their business leader with achieving the goals of his/her strategy.

7.0 Theoretical Implications

In attempts to conceptualise a businesses' ability to leverage the power of business analytics, a large proportion of research papers have based their findings on the theoretical underpinning of Resource Based View (RBV) (PatrickMikalef, Pappas, Krogstie, & Pavlou, 2020). As mentioned earlier in the paper, RBV is a lens where , firms that are in position of certain resources will be more likely to achieve competitive performance gains due to the ability to orchestrate these resources towards specific goals.

Most of the research and literature in the context of business analytics, as seen previously, has been focused on the areas of intent to adopt and usage [14], and as per the authors knowledge no work has been done around the post-implementation stages – the creation of value. This research contributes to this stage of the literature stream of IS value related to analytics applications deployed as a service, with empirical research focusing on process level performance, organisation level and people factors.

This research paper is an early attempt to capture and understand the business value juiced out of a new variant of business analytics – Analytics as a Service (AaaS), by using case study methodology by understanding the factors and pillars that constitute an organisation's business analytics capability. With the chosen model of analytics resources that comprises a firm's business analytics capability, with their underlying elements and interactions, the case study research has brought out a set of factors at the organizational, people and process level from the cross-case analysis that can add to further business value studies in business analytics.

Primary contribution of this research paper is utilising Analytics as a Service (AaaS) in the RBV theory and integrating it with the business analytics capability framework to establish understanding of the emerging value creation out of aforementioned BA capabilities. From the dimensions that have emerged from the case studies, it can be seen that elevating the technology pillar (by AaaS) influences the value creation by the underlying component of by namely improving process to a great extent, organisational levers to moderate extent and instil a low value in the people section. An improvement in the technology is a great support but it may not show the expected ripple effects on the other pillars of the organisations. There remains elevating the other pillars (Davenport T. H., 2006)

For researchers, this study provides a basis for further refinement of theoretical models on business analytics capability, being a starting point for future research on this crucial subject. Achieving and sustaining competitive advantage and RBV have been two of the most known and complete theoretical models used in IS research at the firm level; so, identifying factors to extend them is always an important fact, even more, if it reinforces results significance and predictability (Mortenson, Doherty, & Robinson, 2015). It contributes to the knowledge of learning curve of new technologies and that often times even though the learning curve is not high, the employee skills and motivation can still be a hurdle

This study theoretically proposes findings never before combined for this purpose, to explain the analytics value chain). (Naous, Schwarz, & Legner, 2017) argues that literature about the relationship among knowledge management, organizational agility, and firm performance in context of software as a service applications is still limited. This is the one of the first studies that demonstrates that SaaS applications (AaaS to be specific) based on an effective use of BA capabilities can help firms to create a more data led culture and in turn can help achieving competitive advantage.

Understand the role of having a data literacy culture to create business value, among the firm capabilities supported by SaaS is not a research area well covered and this study tries to fill some gaps in theory and previous studies - to show how business value, as an intermediate internal perspective. can be achieved with brining people processes and organisation in harmony, thus contributing to the IT-based business value stream of research.

As data analytics can significantly improve business processes (Davenport T. , 2006), business process enhancement driven by analytics leads decisions is an important research area. Earlier studies focus only on the link between adoption of analytics in lieu of earlier enterprise systems (Abbasi, Sarker, & Chiang, 2016), while this study empirically demonstrates that analytics have come a long way, businesses are

successfully able to deploy analytics amongst various departments but the its conversion into an "end, final substantial piece of value - is where work needs to be done. And this can be worked upon by not only improving the technology further, but it needs attention from other non-technical side of the busines i.e. – business leaders, employees and even external partnerships.

This research paper also demonstrates that using analytics tools effectively so that they contribute to end decisions, results, there might be need for developing some customised tools in house alongside the external partnered tools. The case studies depict several examples where they ended up in an unfulfilled situation while using data lead insights in improving their processes. This led them to learn from these external tools and build a layer on top of it which was customised specifically for their use cases.

8.0 Managerial Implications

This section discusses the implications this research papers has on business managers. Business leaders and use this section as an inspiration and guide while looking into how they can induce increased value creation withing their organisation while deploying and using AaaS tools. The section provides a total of **three** implications, namely: Leadership Denial, Data Literacy Culture and Redesign Jobs

8.1 Leadership denial: Need to Overcome

Let's face it: getting value out of AaaS and other analytics tools is not purely a technical challenge. Deep down, this path is about securing leadership buy-in from the top down in the first instance. There is no denial in the fact that technology matters but if an organisation's senior leaders do not see a rationale for or are not ready to weave analytics into the fabric of the operational processes, any analytics initiative undertaken by data analytics evangelists is destined to fall face down in vain. While big data has been around for quite a long time, a whopping number of organizations have not yet achieved a transformational level of maturity in terms of data and analytics (ITrex, 2020).

The fear of change, inadequate resources, big investments or inability to grasp the business value of practicing analytics based facts – for whatever reason, a significant number of business decision-makers are still sitting on the fence about embedding AaaS or any other analytics solutions into their operations and rather keep putting their trust into intuition

While businesses across the world are trying to make more effective use of data, analytics, and AI, a key impediment is holding many of them back: The lack of a culture that truly values data/analytics capability and the superior decision making that can flow from it. In addition to trying to convert a passive or reluctant CEO, three types of change programs can move an organization in the right direction: Educational programs, leading by example, and promotions and rewards (Subrahmanyan & Jalona, 2020).

Head of Analytics at Bank of America says "My entire job is supporting the objectives of a business leader. How do I learn his strategy? How do I engage with him using language that is familiar and comfortable to him? How do I approach him in a way that is inviting instead of in a way that might put him on the defence? Those are all really important things for doing this job on which the business leader should align and try to communication to analytics department as well as he entire organisation (Maley, 2020).

(Hürtgen & Mohr, 2017) calls it as change management which states that , managers need to change their way of making decisions to take advantage of analytics. This is the heart of the change-management challenge—it is not easy, and it takes time. It is possible to drive change which is organisational wide but orchestrating change in all of a company's daily decision-making and operating approaches is a time-consuming process and can prove too overwhelming to be practical. Hence, it is advices to start small i.ee focus on some areas – pricing, inventory management, etc. and take it from there to scale the thinking up to an organisation wide level.

Better to pursue scale that's achievable than to overreach and be disappointed or to scatter pilots all over the organization as One-off pilots often appeal to early adopters but fail to cross the chasm and reach wider adoption or to build momentum for company-wide change (Hürtgen & Mohr, 2017).

Business leaders should introspect and ask themselves the question: which departments or functions would benefit from analytics and deploy a combination of new targeted solutions, visualization tools, and change management and training in those few areas.

For example, WizCo. saw room for improvement in customer churn rate management and applied daily reporting of churn rate to marketing department's analytics manager and could observe that "when more than one emails are sent out in a single day, the churn rate i.e., users unsubscribing for emails, is higher". This led the company to rethink their quarterly e-mail marketing campaign and later on they could see a decline in customer churn That example is a simple illustrations of how a small tool can have obvious observable impact and could in turn make everyone in the organisation see and experience one of the several benefits of analytics. Senior leadership getting on board is one side of the coin. The other side is getting the entire organisation onboard i.e., establishing a organisation wide culture of data literacy. This is was we discuss in the next managerial implication

8.2 Data literacy culture: Make culture the catalyst

The success of AaaS or any analytics initiatives depends largely on establishing an enterprise-wide culture of data literacy. The job of cleaning up and preparing big data for analysis, sifting through this data and finally analyzing often seems like an impossible feat for human minds to accomplish (ITrex, 2020). Even if the senior management is onboard, without culture embeddedness and high level of organisational maturity, all analytics efforts will come to nothing and it might seem like a wasted investment. Businesses should stop making decisions based on intuition and start trusting data led decisions in order to reduce the reluctance to embrace AaaS technologies and catalysing a data literacy culture.

Insights-driven actions are most valuable when widely adopted. Making data insights a part of the standard operating procedures of those employees who haven't traditionally focused on data is what yields real value. Continuing with the churnprevention example, "analytics academies" can help marketing, retention, and customer maintenance employees (among others) understand which questions can be asked of data and analytics and how to bring those insights into their day-to-day work activities (Court, 2015).

Imagine an atmosphere where powerful tools and technologies are provided for the need to discover new features, opportunities, run analysis and make deductions. Then, there exists a possibility to use this as new information or standard and suspends the old way of working, without having to go thought lots of data security, compliance and clean-up - this is all part of building a culture in which data, not guesses, are brought to bear on problems, and where people are comfortable (Court, 2015).

MOVE AWAY from the phrase data driven, data driven strategy, data driven culture. It's not data driven; its business driven. We're using data to support that business, but it's still business driven. It is about the outcome. If I spend all of my energy talking about the algorithm I created, then we still have no idea what we get for it (Maley, 2020).

People buy into change when they understand it and feel they are part of it. The design of analytics solutions therefore needs to be user led and have business-process participation from the start. Having someone called a "translator" — someone who not only understands the data science but also how it can be applied to the business — lead use-case development from start to finish (Chin, Hagstroem, Libarikian, & Rifai, 2017)

Create a playbook every time a new challenge has been accomplished. It should include critical turning points, critical adoption elements and also elements of decisions which were saying NO to a certain action. The business leaders identifies the opportunity, the data scientists develop the algorithm, the user-experience designers shape the user interface, the software developers run production, the process engineers reengineer work flows, and the change agents do the implementation. Develop a playbook for each use case, making sure critical adoption elements such as training and communication are not neglected. Beyond individual use cases, design a broader change program that builds analytics literacy (Chin, Hagstroem, Libarikian, & Rifai, 2017).

Delivering, and hearing, bad news has to be seen as part of business as usual. Set clear stage gates for investment, even while accepting that most efforts will fail, and then increase investment size as milestones are achieved. Emphasize the need for speed. "We fail more often than we succeed in analytics," noted the leader of a business unit at a consumer-goods company. "But we are trying to move more quickly in learning from failures and moving to the next iteration." Also, another important aspect is getting used to the failure, getting used to the iterative approach. More often than not, the first attempt of a new analytics process will not yield perfect results but that it okay, that is part of this learning journey, Emphasize the need for speed. "We see that we fail more often than we succeed in analytics but we make sure to keep trying and to move more quickly in learning from failures and moving to the next iteration." said **WizCo**.

Data from the survey confirms the merit of this approach. In companies where executives report that all employees have been trained on analytics, 88 percent exceeded business goals, compared to just 61 percent of companies in which only select employees have been trained on analytics (Davenport, Guszcza, Smith, & Stiller, 2019).

Redesign jobs: Entice People

One of the old sagas is that machines are taking people jobs i.e., automating a part of the jobs of employees means making a permanent change in their roles and responsibilities. MobiCo. has redesigned the route for its forklifts drivers which resulted in shorter working hours leaving drivers with spare time on hand but nothing to do with it. Device programmes, brainstorming sessions, design sprints and figure out way, together with employees, to fill this time. For example, if you automate pricing, for instance, it is hard to hold the affected manager solely responsible for the profit and loss of the business going forward, since a key part of the profit formula is now made by a machine. As managerial responsibilities evolve or are eliminated altogether, organizations will have to adapt by redefining roles to best leverage and support the ongoing development of these technologies (Court, 2015).

As per (Maley, 2020), a chief data officer is typically about data quality, data management, data accessibility, very, very critical stuff. Many chief data officers are now moving into the space of analytics. But often that looks like we're going to do some automated dashboards, we're going to do some automated analytics. I don't think there's any such thing, for those who really and truly have a blended role,

meaning they're thinking about data, and they're thinking about analytics. Those are two very, very big jobs. But I think at that level, and a strategy at that level is, how do we actually make it work? How do we coordinate around all of these different business strategies? What if we have business units that operate in silos, but we, as a centralised function, see efficiencies that reach across?

Develop seminars where the technical person in the organisation not only learns new how to use new and improved analytics tools but also the leadership skills required to lead the identification and implementation of a use case end-to-end, and the changemanagement skills required to spur culture change Identify high performers and then design a capability-building program to extend their analytics skills.

(Davenport, Guszcza, Smith, & Stiller, 2019) making use of adult-learning principles when designing these programs, combining methods like on-the-job training, inperson learning, and online refresher courses. Consider designing formal certifications to those who successfully complete these courses. This provides recognition and creates a common language and set of standards, in turn boosting employee morale.

Use the above said information and put it forward as the company image, show the industry and other potential employee the kind of culture and ideas the business is trying to instil which in turn will lure them away from large corporations. This comes back to the idea that employees feel more satisfied and motivated when they feel empowered.

9.0 Limitations and Suggestions for Future Research

This section will discuss the limitations by which this research paper is bounded with and will subsequently provide ideas for overcoming such limitations for researchers attempting to further dive in into this paradigm.

The research paper possesses several limitations. Firstly, the sample size for this study is very limited. Despite the fact that there were the valuable and in-depth insights the case studies bought to this relatively new research area, only two case studies were deployed as part of this study

A bigger data sample which helps strengthening the generality of this study to a great extent. The bigger data sample can include case studies from multiple industries (and not just e-commerce companies). Other industries such as automotive, banking would have more diverse use cases and can help going into the nuanced details of each all constructs that affect a business's analytics capability. Also, the sample size for this study only are SMEs and not large businesses. Large businesses usually tend to have more resources and greater flexibility to test and try new technological tools as well as employee training.

It might be the case that the challenges presented in this study might not be of much relevance in case of large organisations. From the perspective of big companies, they may even have a whole research and development (R&D) or professional services department (internal consulting) to look into the matters of how new business analytics technologies deployed within the organisations are creating business value and how it can be further improved i.e., this whole research paper could be a potential department in large organisation which is usually not the case for SMEs

While analysing the data for this paper, the researcher into looked for themes in the data without reference much to the research framework and then used the framework to categorize the findings as per the framework. This approach allowed the researchers to, avoiding falling the trap of ignoring data that did not fit into the

constraints of the framework and remain open to any new ideas or theories formulating from the data instead of rigidly following the pillars of the framework. In future, together with a larger data sample, this paper could be used to produce a first draft of a new research framework regarding the interplay between SaaS analytics tools and other enablers of business analytics capability.

For this researcher, the interview was coded using NVivo by the researcher. This could include researchers' biases and pre-notions which categorising the data. Hence, it puts a limit on the validity of the data and therefore the analysis and findings of this paper. In future, the data should be coded by multiple researchers and then should be compares against each other. This would help find common categories which are validated by multiple researchers, thereby strengthening the validity of the collected data.

In current research paper looks at the information only one way i.e., how a business organisation generating data (internal and external) can create value out of this data via its BA capabilities. In future, researchers should look into what could be called as a "feedback loop" i.e., how this value created can in turn be analysed and the insights can be bought back to the initial stage of generating data and how data generation, gathering can be improved.



Figure 7: Suggested Framework for Future Research

This would mean an organisation embracing the iterative learning approach which, as mentioned in the managerial implications, is a crucial step for businesses to truly embrace the data lead decision making culture

10.0 Conclusion

The aim of this research paper was to look into Analytics as a service and how businesses are extracting value . Subsequently the research question was: <u>How</u> <u>Analytics as a Service (AaaS) is delivering added value to a business organisation, if</u> <u>any?</u> This was one of the first studies conducted to see usage of Software as a Service applications, Specifically AaaS in this case. through the lens of businesses using such services and how they are generating value out of it. Also, this is one of the few initial studies which sheds light on was AaaS is and what are its different characteristics.

The data was collected by conducing semi structured interviews for two retail ecommerce case study organisations. With the help of using a business analytics capability framework found in literature, the findings were given structure and various dimensions were devised. The main findings of this paper are that it is various processes within the organisations that secrete most value out of deployed AaaS technologies whist getting people (employees) onboard and finding the right talent is still a hurdle. The organisation as a whole also needs some efforts, mainly by business's leaders to extract more value out of these tools.

Even though these AaaS tools are a great added support, sometimes businesses need to develop in house similar tools which better server their specific needs and use cases. Analyt- ics leadership being organized more and more at a higher level and every departments is getting used to the idea of having a analytics person within the department

Future studies have abundance of ground to cover when expanding the research within the paradigm of AaaS and its usage and value within different businesses. This research hope to strike off that mindset and encourage more researcher to look into the AaaS applications usage form an end user perspective which in turn could be package as a valuable feedback to the SaaS vendors and help improve their offerings which will again, in turn, help the end user improve their business operations internally, and their end offerings, externally.

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12.0 Appendix

A. Interview Guide

Interview Guide

Analytics-as-a-service (AaaS) and Business Value (AaaS impact on value creation)

- When was the Analytics team formed in your organization? What was the reason behind forming the Analytics team?
- How big is the Analytics team? How is it organized (Geographies, Markets, Businesses)?
- How is the Analytics team sourced (In-house/Outsourced/Third party/Partnerships)?
- What are the Business Processes addressed by the Analytics team?
- How has analytics experience evolved over the years in your organization? What have been the milestones? Has there been a shift to using "Analytics offered via Cloud"?
- What Types of AaaS is your organisation using? (Visualisation AaaS, Self-Service AaaS, Big Data AaaS, Edge AaaS)
- How is the acceptability of these new AaaS tools in your organization?
- How has AaaS helped you, a manager, carry out more data-driven decisions? (Please provide examples)
- And Based on above answer, how does AaaS have generated value in your organization? (examples from marketing, supply chain, sales, customer excellence. Etc.) (Please provide examples)
- Do you think any of your AaaS resources are (Technology/ Infrastructure) providing your organisation with competitive advantage?
- The use of AaaS applications needs novel technical skills which the employee needs to possess. How will you manage this? Would you be willing to get new employees who already possess such skills or take your current employees through a new learning curve?
- What is your thought on Building data skills in the organization?
- What are your thoughts and plan to overcome Analytics skills shortage?
- What are your thoughts and plan to overcome Technical skills shortage?

B. Case Study : MobiCo. data

Interviewer

All right, so yes, 100%? Correct. First, the first challenge is to find these people. And second challenge is that okay? Are these people willing to learn your way of doing or your your tools that you're using specific for your company? That's 100%. True. I'll share my screen now. And it's the document that you sent to me. And I have marked some text on it. And I have I just need more information from you on that. That text. So let's see. Chris off. new to using Skype for screen sharing. So give me one second.

Can you see see it?

Unknown Speaker Yep. Yes,

Aditya Saraf

great. So by the way, I love this. This sentence that he said here that we understand us not as a retail company, you understand us as a tech company, this was beautiful. I'm going to use this as a direct quote.

MobiCo.

The question is, is there something different if we change from furniture? To a product?

Aditya Saraf To what kitchenware? Yeah.

MobiCo.

So maybe, tomorrow, we can produce and import and sell kitchen, kitchenware products, or garden furniture, or leisure products?

Aditya Saraf So as long as it's

Unknown Speaker

all the processes, all the IT infrastructure, all the data, and how we work with all this data? And all our cloud systems? It's the same, not depending on the product.

Aditya Saraf

So it's, it's the same as long as it's a consumer product. Can you? Is it okay to say that? So as long as it's something which is going to end consumer, the processes or the the infrastructure that you're using right now can be easily duplicated? If tomorrow you switch to kitchenware, or?
Yeah, okay. So, if we, at the moment we handle with end consumers as part of our company, and the second part is our b2b sales, where we deliver our products to large main order companies in Germany and across Europe. And so we have both parties. Okay, it's not necessary if we sell them garden products or furniture products, or

Aditya Saraf

Yeah, light wear or kitchenware? Yeah, exactly. So, so here in the question, where when was the analytics team, from the new organisation? And what was the reason behind it, you mentioned that companies do not know the important figures to effectively decide which measures they bring strongly forward and which only mean that a lot of work. But which means a lot of work, but only to have a small positive influence on the development and growth and profit when you say this, because any specific use case or example comes to your mind. Yeah.

Unknown Speaker

I see many companies are working today, the same way as they worked one or two years ago. Same working processes. And same people, everything is the same. But the market and the possibilities you have on the market regarding two new technologies are changing so fast. They don't apply to this new possibilities thing. us, they make the job today, in the same way. They done it one year ago. And so we are totally different. Our processes are recreating every half year, we see new ideas, how we can handle it better, efficient, deliver a better customer service, or whatever. We will, we will adapt it for the future. And he started directing, never ending learning progress. Yeah.

Aditya Saraf

So you would say that your process is more like a scrum process. So it's always going back to the basics and trying to see okay, what's the new new trend or new technology and trying that? And yeah, if it works, implementing that, and revisiting that after a while,

Unknown Speaker

so it's in Germany, I don't know if I can translate it one to one. People say, Oh, we do it this way. All the time. It's fine.

Aditya Saraf

Yeah, that's how it has been. Yeah. Yeah. Yeah, we do it like this. Every time it works.

Unknown Speaker

Not thinking about that. What I'm doing today? All right in 2021? Or is there a new way to do an important thing? Yes, yes. So think smart. Not hard.

Aditya Saraf

Yeah, exactly. And like you said, and the thing that you're doing, it might work, but there might be a better and smarter solution available that you can use. Yeah, that's correct. And as you said, most companies in your experience are failing to do so they're still okay with their process, because they're technically still working right.

All employees knows the processes? Yes. So they say never touch the running system.

Aditya Saraf Yeah. If it's not broken, don't fix it.

Unknown Speaker

For some parts. You find with this? Yeah. But you have to check for all departments. All day long. Is there a possibility to improve your power? Yeah, yeah, make it smarter to give the person and the employees more free time, by automation, and so on. And for this free time, you don't need less people. But the people you have, and hopefully, a good quality five people have more free time to do new interesting things. Push the business.

Aditya Saraf

That makes sense. That makes total sense. And yeah, I think this also relates to this, this part that if you think about analysing business value, you can see that 20% of the activities accounted for up to 80% of the progress is

Unknown Speaker

miss any people don't think about it. Yeah, yeah. But that's, I have to work eight hours. That's it. And if you say, hey, if you make the new working process, I know, it's a hard work to do this. But when you have only six hours of work, yeah, but my time at work is eight hours. So should I sit here and do nothing or no? Think about? What can we improve? can we do better than other companies? Which which data do you have? And which data we have to collect? And to find new ideas?

Aditya Saraf

This that that makes sense. And but as you said, People don't usually do it. So and this

Unknown Speaker

has to do I have no time to thinking about it?

Aditya Saraf

That's always the excuse, you hear I guess yeah. And this question here, what are the business processes addressed by the analytics team and here the last point the dimension is order volume per employee, so I actually did not understand it. So what do you mean order volume per employee,

Unknown Speaker

for example, we have implemented new warehouse IT system where everything is automated and our logistics system, looking which order needs the product from which storage location, okay, and optimise the way for the forklift drivers to have shortest ways to the warehouse. And we have different types of forklifts. The one type is you can load two pallets, but you cannot lift them. So it's kind of forklift only working on the lower level, ground level. And they are very fast. Each row they drive. And the other forklifts are especially very good in lifting very fast these items are at the higher levels. The next thing is how to make the incoming goods storage in your warehouse you become containers with goods and our IT system. Now realise Okay, this item comes from the container you make PPP on the pallet and scan the incoming goods. And if the pallet is full, you can say a pallet for any becoming barcode sticker on the pallet and the forklift driver picks a pallet scans one barcode and one and the computer system says to which storage location you have to drive. Sure. So what is the reason you can choose the next free storage location no our system analyses life in real time. Is the item top selling item not selling item that item which leads to storage location, for example for items which are longer sidebars or whatever Sure. Or is it a brand new item which have to launch first in the next few weeks so we storage in a higher level because if you pick the goods, the fastest way to pick it on the floor floor. If you have To lift,

Aditya Saraf then take your time.

Unknown Speaker

Yeah, I was system, optimise which item needs which location. And if it's, it's a location quite near to the outgoing goods location to the packing area or far away. So if you have items, you only need one or two pieces of data you can store it makes the storage far away from the outgoing goods area. But if you have an very top selling item and you sell 10 2030 pieces of this furniture item each day, it should be a good idea to store it very close to the outgoing goods area. So the all the pick and pack time you need to send and ship the item is much faster. It's

Aditya Saraf much faster. Yeah, so more efficient.

Unknown Speaker

For example, regarding to evaluating data. How much piece are selling wood cannot store the item very close to the output area or far away. It helps us to improve our packing packaging capacity with round about 50 to 60%. than in the past.

Aditya Saraf Wow, that's a big jump.

Unknown Speaker

So we have the same employees in our warehouse, but we can do 50 to 60% more work and the same time. And this is absolutely benefit by by the company by the computer. And by analysing data and to work with the student. Not all the companies know how much Pisa say fell.

Aditya Saraf Yes, yes, of course. Yes.

Unknown Speaker

They use this information to say adapted not only for it for extra charge or whatever to say adapt it into real processes into real logistic process. sales. Sales, its foreign sales department. Yes. Okay. But takes this information, this data and put it into the logistic department. You see what happened?

Aditya Saraf

Yeah, right. Right. And and I think that is one of the issues that Academy's mentioned in this idea of generating business value out of business analytics is that businesses most often they are stuck into using this power of analytics into one or few departments. But they fail to look at this as a more organisation wide approach, that if you apply it in organisation wide in every department, then you can generate so much efficiency and value out of all departments.

Unknown Speaker

If every department has to date to analyse specialists, that's fine. But if you have one, one guy in logistic, he don't know about this data. And I don't know how to use this data. And this is the problem. You need people who understand not a department will understand the whole company as one big thing. One,

Aditya Saraf yeah, yeah. That's

Unknown Speaker

not from the department side, on the processes, looking from above to the processes. Okay, what can we improve? So what is the main thing we have to do because it hurts, it hurts, we have to have a larger payroll on the employees, if we increase the business. So is there any possibility to keep the payrolls on the same level, but to increase the business and I think there's a good number where you can measure it, you can if you can make more order volume, from the customer service up to logistic by same employees, or you increase the employees, but for example, 20%, but you can make 50% more sales, that's a win by, by the most of the companies if they are growing at the beginning, and that is you. You make 10% more sales? And 12% you have to pay more for the people the people more

Aditya Saraf Yeah. Then that's not a super valuable investment

Unknown Speaker

possible. To to scale such a business? No, no, no. Too many bad parts in it.

Aditya Saraf Yeah, that's true. That's true.

Unknown Speaker That's percent true. Okay.

Aditya Saraf

Moving on to the next question. The question was, how was analytics experience evolved over the years in your organisation? And what were the milestones? And has there been a shift to using analytics offered via cloud, which is also known as analytics as a service? So here, in one line, you mentioned that we invest in a lot of money and time in our own cloud automation software. So could you just give me one use case of, if not the name or if, but tell me what this one of the software is doing or how you're using it in which process.

It's helpful to you at our last point. It's, it's a complete system. So we have cloud systems. We have our moment systems, but we Scene set many, many ideas we have, we cannot implement it in current systems, they are made for, for a wide range of interesting people a large market. And so we can to start our own software development department, and to programme our own software, where we can implement all things we think about it. So if you have a working process or whatever, and you can write down, if that happened, I should do this. And if the if this happen, it's possibility A, B, or C, A if B, if or else C, and if you can write this down, not depending on department on the company on every single department. Okay. You can make you can make a computer system

Aditya Saraf

on it. Yes, yes, of course. And that's how the programming works, right?

Unknown Speaker

So so everything is starting, it's this kind of way. And if it's, if it's working, then the people see the benefit. Can we do other things? Or since we have this tool, and we okay, but we need more information in we need more data? Then we say, okay, happy state or happy? Should we generate this data for the future? And the systems go more and more intelligent and helps us do more? So we spend a lot of money and time for our own system, which is perfectly fitting to our company.

Aditya Saraf

And that system, is lying on premise in the company, or is it just somewhere stored in the cloud, the technology, the software that you've developed

Unknown Speaker

to storage in the cloud. So we have a web server set from every, every place in the world through our software. And we have no client service fracture? As you know, from all software, we have our web server with cloud software is running our own cloud software. Okay. Okay. And you can use it by mobile phone or by web browser, Chrome, Safari, or whatever you want.

Aditya Saraf Okay, that sounds

Unknown Speaker

cool. There's the possibility. So we have own API's can share information with our customers need.

Aditya Saraf

Okay, so shareability is an option if your customers require, then you have an API to give to your customer and you can share Yeah, okay.

Unknown Speaker

Okay, for products for input for keywords for to synchronise orders, order confirmations, and whatever you want to delivery times.

Aditya Saraf

This. That's, that's good to know. That's interesting. And come and coming back to coming to another point, which is, but it is not so easy to find new employees with this mindset in our local area. So if if I would have to ask that, okay. That is the case right now. That's okay. I understand that. But what is your idea or plan to overcome this? challenge? Or hurdle?

Unknown Speaker

Wrong replace, to pray? is suitable prison? No. You have to find people and to if you have one job. And if it's possible to get two people, which could be suitable for this job, hire two people. Okay. And one of one of these two people's you will see three months later. 10 is he or she is not good. So cancel the contract. So but if you tell me the question, what happened if both peoples are good? What are you doing them chequered. Perfect, and you have two very good people. You can grow with them. It's not a problem. I only looking for one person, which is good. Okay, but if I can find two persons, hey, perfect. There's so much work to do. And so much ideas. So it's like of the rabbits. Today, you have one tomorrow you have 10. And if you finish one good idea, on the way to finish this one good idea. You have 10 more good ideas on the way. Of course,

Aditya Saraf

this doesn't represent true like in the process, you always evolve the end result. Yes, yeah. Yeah, of course. So that makes a lot of sense.

Unknown Speaker

Yes. Back to your question. It's very hard to find good employees. Good employees work. Thinking and working with new technologies, if working with common technologies like you do it the last 10 or 20 years, and still problem now to find people who are willing to learn these skills and able able to signals. This is not so easy going, especially in our more land, Atlanta area. So the next large city is one hour by car, by the way. So we're a smaller city with 14,000. persons. So,

Aditya Saraf

yeah, so then you can say that the talent has a higher chance of getting attracted to the big city. Right. Yeah. That that

Unknown Speaker

universities if it there and multiply, and you've made more companies, which auto hire them?

Aditya Saraf

Yeah, that that makes sense. And I have one more question for you. Just, which was not the restrictions that it was quite clear. So this, this concept that analytics as a service, which is basically now the power of performing basic analytics, it could be visualisation of dashboards, or it could be just a very basic graphs, or charts, right. So now this power is given to the companies with various software's and tools available, right, you can just pay for them monthly, and you have access to them, and you can use them. Do you think this idea, or this wave that has started in the past years has somehow helped in developing a more data way of thinking throughout the organisation? Like, since it's becoming more and more approachable and accessible to all companies? The power of basic analytics, right? So do you think that has helped in the past five years to drive a more data driven culture in your in your product?

Unknown Speaker Or our company?

Aditya Saraf Do you think that was a facilitator or not?

Unknown Speaker

We live in this says technology thinking from the first day.

Aditya Saraf Okay.

Unknown Speaker

So for us, it's nothing special. It's a good support? Yes, yes. If you see, more and more people are using the same big data sets at the head. And they want to do the same with the data, for example, to increase your sales on product Sure, product A, that they're getting all the same information from this Big Data Cloud. So it's nothing special any longer. So you have to take care, that the information you get has the right value. Yes. Yes, I agree. You can get a lot of information, but what kind of information have a good value and which have not good

Aditya Saraf

for you? Yes. And that's the difficulty. Yeah, that's the difficulty. And that's true. How would one overcome this hurdle? Or what's your idea? Or do you think a good strategy a good plan can be a good starting point can be or what do you mean for overcoming this hurdle? That Okay, you have this abundance of data and you have this, there are so many data points, but how to figure out that what are the data points, you are looking for? How to make that classification?

Unknown Speaker

And the first thing is, you need a problem. in shape.

Aditya Saraf Yeah,

Unknown Speaker

you can have all the data of the world but if you don't have a problem, if you want to solve, you don't need all this data, but if you have a problem you want to solve and I mean, look at your biggest problems, the problems which are really hurt. Not not a small problem problems in the company, whatever the big problems you want to you want to solve or you want to improve it. Find its first problems and look which information I need. event. All this data can help you.

Aditya Saraf Yeah,

that's a good idea what you want to do, or only to print a beautiful chart on the

Aditya Saraf

wall. No, no, that doesn't make that won't create any impact. In the end. It's just a lot of information put beautiful.

Unknown Speaker

Yeah, so we are working with data to improve processes. But first, we have to find an idea, okay. What we want to improve our time Target. If you can write down your target, then you can go the other ways. Start working on the target, just to start looking which permission you need, then how to adapt it into a into the process? And yeah, you

Aditya Saraf

know, that all makes sense. And I think this comes back or this aligns with what the literature says about business value of business analytics that, yes, there is a lot of data points and information available to managers right now. But the more most often they struggled to find the core reason why they want to use this information or value, what's the problem they are trying or wanting to solve? So yeah, the best this very basic step is usually overlooked. Number Yeah, yeah. That makes so much sense. And but oh, well,

Unknown Speaker

yes, this data can help you to compare, compare you, or your company with other companies. It's all very interesting.

Aditya Saraf Yes, yes. But and

Unknown Speaker

every company has some parts. Sarah better or less, less good than other? Hmm, that's true.

Aditya Saraf

That's true. Yeah, that and I guess in a way, that could mean that, you know, eventually, this could become a point of competitive advantage for you if you're using this information in a better way. Or if you're able to generate impact from this data into optimising your processes or increasing your sales, then that's your competitive advantage, right? The way you have lived, the way you have structured the steps ABC, you have don't write for your processor, your company, now it's getting more, let's say, revenue. And that's the competitive advantage because Company B does not have this list of ABC processes that you have now. So that sounds super good, super insightful. And I've I see a lot of alignment with what delicious says, but I also see some very new way of new input that you know, what's still missing. But of course, this is a small study, which is a master's level study. So my data collection is only three, three case studies, right? So I cannot claim this as a general way of that, that this is what is going on in the business world right now. But in my limited sample, I can conclude that that's the pattern that yes, as you said, it helps it is supporting your your, the way the way, the destination that you want to be yet, but still, the destination is far away. You're still in the process. It's still evolving. You still need to learn as you proceed.

Unknown Speaker It's a never ending story. Yeah.

Aditya Saraf Yeah. Yeah. That That makes sense. That makes sense.

Unknown Speaker But if you like it, it's fun.

Aditya Saraf Yes, exactly.

Unknown Speaker It's not a problem for you. Because you say, Okay, I cannot finish my work.

Aditya Saraf That's fine. But that's that's part of your work.

Unknown Speaker If you think about all this data and how to use this data, to to improve your company,

Aditya Saraf

it's fine. Okay, that's your work getting challenged. That's your work. So if you'd like it, but yeah, exactly. If you don't like this getting challenged every day, then. Yeah. But I guess you do. And I think that's the culture you're trying to invest in your business that, guys, we should enjoy these challenges. We should like these challenges. Super good. Daniel. Super good. This was really again, super helpful. Yeah, I have a lot of input or a lot of things to put structure to and present for my my supervisor. Yeah, and I think she will be. She would have a lot of questions firing at me. But I have facts to back it up now. But

Unknown Speaker more information later. Yeah, I

Transcribed by https://otter.ai

MobiCo. Analytics-as-a-service (AaaS) and Business Value (AaaS impact on value creation)

When was the Analytics team formed in your organization? What was the reason behind forming the Analytics team?

We founded our company in 2007 as a pure e-commerce company. At that time there were no e-commerce platforms like Amazon or Alibaba. And eBay as a selling platform was still in the beginning at that time.

And also, in 2007 we thought about: "What data can we get from our customers and the purchasing behaviour of them and how we can generate added value with this data".

With this experience of the first few years around data, collecting and evaluating data, we built up every department in our young company to meet measurement by data.

Let's take a look at the most companies in the market. They exist. That is correct. But how are they developing? How difficult it is for many to grow. And by that, I mean growing profitably.

Often the problem belongs directly in the evaluation of the data or, even worse, they do not know what data is available or they have not designed it to be machine-evaluable data.

Companies do not know the important figures to effectively decide which measures they bring strongly forward, and which only mean a lot of work but only have a very small positive influence on their development (growth and profit).

If you think about analysing business value, you can see that 20% of activities account for up to 80% of progress.

But how do you find this? By making all activities trackable by machine. You can concentrate on a few areas to bundle all strength and energy there.

How big is the Analytics team? How is it organized (Geographies, Markets, Businesses)?

Every department have their own analytics manager. Retail Business, Purchase, Item content management, Sales, Customer satisfaction. How is the Analytics team sourced (In-house/Outsourced/Third party/Partnerships)? We have only in-house sourced teams.

And our in-house teams are using the in-house data and analytics tools - as well as external tools from providers to evaluate and optimize the effectiveness of online advertising and much more.

What are the Business Processes addressed by the Analytics team?

Online product sales (per Item / per Category) and compare with the past Profit rate from purchase to Sales

Return rate of products

Customer satisfaction per sales channel

Growth per sales channel or growth per retail customer

Speed of responses to customer questions (how many minutes from question to our reply)

Order volume per employee (how to grow with more automation by same employee)

How has analytics experience evolved over the years in your organization? What have been the milestones? Has there been a shift to using "Analytics offered via Cloud"?

We started with simple Excel lists in 2007.

Then we added 3rd party tools as cloud solutions.

Later we realized that these solutions could not provide all the data and reports – as well as automated actions - we needed and we started to develop our own software with our software engineering department, which covers all our processes and company areas.

We invest a lot of money and time in our own cloud automation software. Even today we use external cloud analysis tools for certain areas (such as evaluating online advertising).

And yes, we see are strong shift in using cloud systems. With cloud systems you can access to the data you need from every location in the world and to every time. You can react much faster to changes.

What Types of AaaS is your organisation using? (Visualisation AaaS, Self-Service AaaS, Big Data AaaS, Edge AaaS)

We use reporting tools to identify changes (positive and negative) and to see how to act.

We have developed tools to create and visualize sales forecasts, as well as warehouse capacity use and cash flow management.

We evaluate sales by product type and customer class.

We use big data tools to search for related keywords for our online marketing and much more.

How is the acceptability of these new AaaS tools in your organization? We are a young team (25-40 years) and we understand us not as a retail company. We understand us as a tech-company. And it is important to love and understand these tools, our digital way of working, this technology and this data.

BUT: It is not so easy to find new employee with this mindset at our local area.

How has AaaS helped you, a manager, carry out more data-driven decisions? (Please provide examples)

And Based on above answer, how does AaaS have generated value in your organization? (examples from marketing, supply chain, sales, customer excellence. Etc.) (Please provide examples)

Retail sales:

We have recognized that 80% of customers only make 20% of sales, but this 20% of sales take up 80% of our time.

=> Solution: we have created self-service tools for these small retail customers to have our time for the larger customers, who account for 80% of sales and 80% of growth. And we spend much time to expand the automation rate for these larger customers.

Purchasing:

If you add new items to your assortment it is heavy to find out which items would be top-seller and which not.

=> Solution: We are using market analysis tools to find data driven trends for products:

- types of products
- which colours
- which materials

are most in demand on the market, right now.

=> So we can adjust our purchase activity to which the market is currently demand.

Production / Freight:

We have developed automation and intelligent tools that evaluate and monitor data from placing the ordering in Asia up to the delivery to our warehouse. For example, if the delivery time is longer than planned, our software automatically warns us if production time takes longer than planned and help us to take actions without any further delay.

Import Sea-Freight charges:

We have developed a tool that compare shipping rate offers at any time for each seaport from which we are shipping goods and always filter out the cheapest of our 5 logistics partners and suggest them directly. \rightarrow This saves us a lot of time comparing freight offers. This is what our computer system does for us.

Customer satisfaction:

We have 3rd party tools to monitor and evaluate our customer satisfaction. Should the Customer satisfaction go down below our target value of > 98%, we receive a message and data from the not satisfied customers and can summarize this data to look for suitable actions and then implement them quickly. For example, to collect the reasons of the not satisfied customers and find the main problem to work on a solution for the future.

Online marketing:

We use 3rd party tools to evaluate the success (cost per click) of our advertising spend for each sales platform. Here we use a brand-new AI software that automatically optimizes the marketing campaigns.

Do you think any of your AaaS resources are (Technology/ Infrastructure) providing your organisation with competitive advantage?

Yes.

We live in a technological world.

More data means more knowledge and more knowledge means being able to make faster and better decisions.

We work every day to optimize our IT systems and data systems.

And with every month and every year, we become more effective.

The use of AaaS applications needs novel technical skills which the employee needs to possess. How will you manage this? Would you be willing to get new employees who already possess such skills or take your current employees through a new learning curve?

That is a difficult question.

Especially for our situation. We are in a small town and the next bigger city is a hour away by car.

It is very difficult to find staff who are familiar with this technology.

It is also very difficult to find staff who are interested in dealing with this new economy.

We have to train and educate our employees day by day.

If we could find a person who is able to do this, we would hire them.

Life is an ongoing learning process these days - much faster than it was 5 or 10 years ago.

And the demands on technically knowledgeable employees will continue to increase in the upcoming years.

What is your thought on Building data skills in the organization? We try to train our mangers to understand and to use all our data for work with it and to create new ways for improvement.

What are your thoughts and plan to overcome Analytics skills shortage? The lack of analytic skills is one of the biggest problems. This cannot be solved immediately, as you have to build up the skills of the employee piece by piece and day by day.

What are your thoughts and plan to overcome Technical skills shortage? The lack of technical skills is the next big problem. Very similar to the analytics skill's shortage.

This cannot be solved immediately, as you have to build up the skills of the employee piece by piece and day by day.

C.Case Study : WizCo. data

WizCo. Analytics-as-a-service (AaaS) and Business Value (AaaS impact on value creation)

When was the Analytics team formed in your organization? What was the reason behind forming the Analytics team?

The company started in 2011 as purely selling furniture online to our customers in Netherlands. Back then we only had a hand full of suppliers, mainly from china but as the business grew and we had more suppliers from across the world and increased demand for different types of product we thought we should do something to learn from these new patterns and behaviours. That is when we decided to setup an analytics department.

The department is not that old, was set up 2-3 years ago

How big is the Analytics team? How is it organized (Geographies, Markets, Businesses)?

We have one analytics teams which takes requests from other departments whenever they need some information which could be found in the data we generate. This team is made up of 6 people

How is the Analytics team sourced (In-house/Outsourced/Third party/Partnerships)?

Our team is completely in house and we house mainly tools provided by other big vendors

What are the Business Processes addressed by the Analytics team?

That is a difficult question to answer. I can try to divide into two sections maybe – customer facing and backend.

In customer facing:

Response rate in answering support query, duration of customer calls and categories their issue into different categories and thus improving our FAQ section. Then there is this tool view use to monitor cart activity of the customer when they start adding products to the cart

And of course, analysing what products are selling best at what part of the year and deciding our next purchase order from our suppliers accordingly

In backend:

We are currently looking into some sort of process which can detect defects in good upon their arrival on port instead of doing it manually currenlty. In our warehouse, we use telematics systems to track the usage of the machinery used to work in the warehouse.

But we see the need of more work to be done here in the backend department, there is so much improvements that can be made.

How has analytics experience evolved over the years in your organization? What have been the milestones? Has there been a shift to using "Analytics offered via Cloud"?

Our experience with using analytics tools is limited, as mentioned earlier. When we started using analytics, most common choice was already using analytics services offered via cloud. We buy their subscription, and we use them.

This is very nice as then we can access these tools from anywhere and do not have to be at office computer. And now that everyone is working from home, it's soo good to have such tools available from anywhere.

What Types of AaaS is your organisation using? (Visualisation AaaS, Self-Service AaaS, Big Data AaaS, Edge AaaS)

We use some visualisation tools to see trends foe example how a new product we launched is doing or is the marketing campaign for this product delivery best results or not

Then we use these tools for forecasting sales and forecasting inventory restocking Since our company is small we do not use any Bid Data tools as we do not yet generate big data

How is the acceptability of these new AaaS tools in your organization?

It has been challenging in honesty. Although we started our business directly as an online commerce, our company is still very traditional working. The team, apart from analytics department, is used to the old way of doing things, structured way of doing things.

So, when the young team in analytics departments is taking time to run multiple versions of their reports so they can find the best report, it frustrates the other departments it causes them delay.

But everyone is eventually seeing the benefits out of such way of doing things

How has AaaS helped you, a manager, carry out more data-driven decisions? (Please provide examples)

And Based on above answer, how does AaaS have generated value in your organization? (examples from marketing, supply chain, sales, customer excellence. Etc.) (Please provide examples)

Marketing

Helping to optimise our campaigns and let us know if we should spend more on Facebook ads or Google ads for example.

Purchasing

This is based what is selling the best. We analyse that and place our next order accordingly. Thus, is helps us using our warehouse space optimally as now it is more filled with fast moving products and less space is blocked with sloe products

Supply Chain

We are constantly working on our new tool that we bought to optimise routes and storage capacity in our warehouse

Customer Excellence

These tools are making us proactive than ever and out customers pike that and we see improvements in customer satisfaction overall. When a customer lodges a complain, the tool we use automatically looks for keywords in the complaint and runs it through out self-built database of keywords and related resolution. If there is a match, then our representative sees it and then they decide if it's the right resolution or not

This saves us a lot of time in finding the solution

Do you think any of your AaaS resources are (Technology/ Infrastructure) providing your organisation with competitive advantage?

We definitely see some improvements and advantages of using these tools. Everyone today is using some sort of analytics and we do not use it then we will fall behind.

We are generating data, so it makes sense that we use it to improve out business and improve profitability.

Our analytics team also look into different tools that we can use which might suit out needs better. I see big potential here

The use of AaaS applications needs novel technical skills which the employee needs to possess. How will you manage this? Would you be willing to get new employees who already possess such skills or take your current employees through a new learning curve?

It is hard to find people yes. Especially when they see that we are such a traditional company, then they want to go into a more modern company where they can adjust easily.

It is also difficult to find people who know how to use the tools we are using and also the people who not only knows how to use the tools but also knows how to think that how we can improve on these tools, make these tools even more useful

What is your thought on Building data skills in the organization?

We try to talk to people in other departments and explain out approach and finings to them and try to get them involved our way of working and look for their feedback . As their feedback is very important because we want to know what they want, what is the question that needs to be answered so that we can then try to find answer to that question in the data.

What are your thoughts and plan to overcome Analytics skills shortage?

This is a big problem; we are constantly looking for new people who knows how to use such tools and have the mindset of improving things

What are your thoughts and plan to overcome Technical skills shortage?

I think nowadays technical skills and analytical skills go hand in hand. If you know how to use technology but are not analytical in your thinking, your dashboards ot suggestions will not make much contribution. And if you are analytical but to not know how to use the tools, well then you do not know how to use our tools and then is a big obvious problem