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MAKING SENSE OF BUSINESS ANALYTICS: THE CASE OF TWO START-UPS

Extended Abstract

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Abstract

Business analytics have enabled businesses to leverage unstructured and dispersed data in order to improve their operations and position themselves better within a highly turbulent environment. While much discussion has been focused on how businesses can move from data to insights to decision making, much less is known around how businesses actually interpret the insights provided by business analytics tools. This extended abstract proposes the use of sensemaking as the theoretical lens for interpreting these insights, combined with contextual information. We will be using two case studies to further explore the applicability of our proposition.

Keywords: business analytics, software developers, sensemaking, start-ups.

1 Introduction

Business analytics have been driving a significant change across a number of areas, from operations and manufacturing (e.g., Gunasekaran et al., 2018) to retail and marketing (e.g., Griva et al., 2018). This increasing interest stems from the potential of business analytics. Applying business analytics can lead to new insights and improved business outcomes (Gartner, 2018) on the basis of facilitating evidence-based decision-making (Pappas et al., 2018). Such decision-making allows for increased performance and agility, and business and organisations to innovate when and where it is most needed (Mikalef et al., 2020).

Despite the promise of business analytics, recent findings suggest that there is a fragmented understanding around their role (Conboy, Dennehy, et al., 2020) and how exactly these tools create value for the business (Ashrafi et al., 2019; Dong & Yang, 2020). The evidence suggests that businesses cannot attain the benefits of business analytics in a straightforward manner. Instead, business analytics must be combined with "superior decision-making" to create value (Sharma et al., 2014, p. 433). In addition, business analytics need to become routinised within business processes in order to influence organisation-level outcomes and create value in the longer term (Mikalef et al., 2020). As a result, to take advantage of business analytics, businesses need to use these tools in a way that allows them to transform and make their data explicit, because it is explicit insights that help businesses take actions and move from insights to decision-making (Sharma et al., 2014). At the same time, this suggests that we need a better understanding with regards to how businesses make sense of the provided insights within the turbulent context within which they operate.

The aim of this study is to address this by focusing on how business analytics support businesses learn and improve their decision making, drawing from the theory of sensemaking. We posit that sensemaking can help us understand how businesses make sense of their data and the complex

visualisations business analytics produce, within the context of organisational processes and structures (Namvar & Cybulski, 2014), against the background of external and internal events. Our study draws from two small start-ups and discusses, first, how business analytics can be used for managing and prioritising IT projects, and therefore used by businesses for organisational learning and innovating. Second, we show how the theory of sensemaking can be a useful lens for theorising around the design, development and use of business analytics for project management and project prioritisation.

The paper is structured as follows. The next section provides an overview of the theoretical background that guides our research. Next, we present our study's methodology, with a short description of our two case studies. Finally, we include a short discussion on our expected contributions.

2   Theoretical Background

2.1   Business Analytics in Systems Development

To date, an abundance of definitions and descriptions of business analytics exist in the literature. Mikalef et al. (2018) and Holsapple et al. (2014) have separately compiled comprehensive lists of definitions, and drawing from both studies, it appears that business analytics are generally seen as a collection of technologies, methodologies, systems, applications and tools that enable organisations to analyse and explore business data, and use the insight towards decision making.

Within the context of systems development, business analytics often take the form of software metrics, to measure lead time, cycle time, throughput rate (Conboy, Dennehy, et al., 2020), and make estimations on the basis of effort, velocity and releases, among other metrics (Arar & Ayan, 2016). As such, software metrics can be particularly useful and provide critical insights with regards to the development process.

However, software and systems development typically take place within a fast-paced and often turbulent environment. A number of stakeholders are involved, ranging from developers and testers, to architects, analysts, managers and, very often, users and clients. Each may have different interests in the metrics they want to use, and even competing interpretations of what 'value' is and how it can be achieved.

In this study, we view business analytics as a tool that helps software developers and projects managers to understand their projects from the multiple perspectives they hold in two ways. First, business analytics can be used as a way to assess the progress of a project along the triple constraints of time, cost and quality (Wiener et al., 2019) for tracking, monitoring and managing the associated risks with the progress of a project (Conboy, Dennehy, et al., 2020). Second, business analytics can be used for managing project portfolio management and prioritising projects. Sharma et al. (2014), for example, have argued that business analytics can be used for resource allocation and orchestration, because they help businesses reconfigure their IT capabilities by providing them the necessary insights to do so (Daniel et al., 2014, p. 95). However, Constantiou et al. (2019) show that businesses often face unstructured problems during project selection and prioritisation, when the mere use of business analytics is not enough; instead, business analytics need to be combined with intuitive judgements so that the insights derived can be appealing, and make more sense to relevant decision makers.

The above discussion suggests that it is not enough to understand the requirements for developing, implementing and using business analytics tools for insights and decision-making without having a good grasp on how businesses make sense of the very insights they receive from these tools, how they make sense of their wider environment (Abbasi et al., 2018), and in turn, how they interpret this sense into decisions.

For these reasons, we believe it is important to approach business analytics from the theoretical lens of sensemaking in order to understand how businesses make sense of these and how they move from the insights they receive to decision making with regards to project management and project portfolio decisions.

2.2   Overview of Sensemaking Theory

Sensemaking has a long tradition in organisation studies (Sandberg & Tsoukas, 2015) with a noticeable influence in a number of other fields, such as emergency response, strategy, communication studies, and of course, information systems (Mesgari & Okoli, 2019). It can be defined as "an ongoing process that creates an intersubjective sense of shared meanings through conversation and non-verbal behavior in face to face settings where people seek to/produce, negotiate, and maintain a shared sense of meaning" (Gephart et al., 2010). Sensemaking is triggered typically during unfamiliar or uncertain situations (Klein et al., 2006a), when there is insufficient or inconsistent information in the environment (Dervin, 2003; Klein et al., 2007) and largely during problematic and unexpected events (Weick, 1988). Sensemaking, in this sense, is the process that allows people, as individuals or as members of a team or an organisation, to make sense of and interpret these events and other people's behaviour (Weick, 1988), in a solution-seeking manner (Zamani et al., 2019).

As a process, sensemaking is situational (Dervin, 1983) and bidirectional, whereby individuals attempt to fit available information into mental representations of a situation (Klein et al., 2006a), by looking both backwards to inform their sensemaking using previous experiences and looking forwards in order predict how the future may unfold (Pirolli & Russell, 2011).

Within the sensemaking theory, we note three different approaches. The first approach is that of Weick, who introduced the concept of sensemaking as organising (Weick, 1979). Weick's approach started off with strong cognitivist origins and later switched to being explicitly a social constructivist one (Sandberg & Tsoukas, 2015). He presents sensemaking as a process where individuals, as part of an organisation and in interaction with each other, take action, make sense of their environment retrospectively, extract and label parts of their experiences and then piece them together, in a way that helps them organise (Weick, 1995; Weick et al., 2005). Another approach is the sense-making theory by Dervin (1983), which has been very influential within the libraries and information science area since the 1970s (Savolainen, 1993). For Dervin, sensemaking is a behavioural that is both internal (cognitive) and external (procedural) that supports the individual to move through time and space, and the core activities are those of information seeking, processing, creating, and using (Dervin, 1998). Like Weick, Dervin sees sensemaking as a process, however for her "sense is the product of this process" (Savolainen, 1993, p. 16), but for Weick "[a]ctions are seen as the product of sensemaking" (Mesgari & Okoli, 2019, p. 217). We note however that Dervin is very flexible in her description of 'sense', which includes, among others, knowledge as well (Dervin, 2003). The third approach is the macrocognitive one, put forth by Klein et al. (2006a, 2006b). This is better known as the Data/Frame theory of sensemaking. According to this, 'data' denote the information available within a given context, and 'frames' denote mental representations or possible hypotheses that link the data together (Klein et al., 2007). In this case, sensemaking entails that "[f]rames shape and define the relevant data, and [that] data mandate that frames change" (Klein et al., 2006b, p. 88), and in turn that sensemaking may require the construction or deconstruction of several frames, and the 'symbiosis' of frames and data (Klein et al., 2007). The Data/Frame differs from Weick's approach in that it is more focused on the individual and their preconceptions, expectations and views (Zamani et al., 2019). Further, it places greater emphasis on the anomaly that triggers sensemaking, the response to the anomaly and the ripple effects of this response (Malakis & Kontogiannis, 2013).

The current study focuses on the use of business analytics within the context of organisations, seeking to examine how business analytics can support businesses learn and improve their decision making for project and portfolio management. We therefore adopt the approach espoused by Weick for the following reasons. It allows us to account for the organisational context, where multiple stakeholders exist and often collide, and to explore how individuals as a collective make sense of fragmented and often unstructured information (Weick et al., 2005), which is quite typical for software projects (Babar et al., 2018). It also accounts for how teams interpret and overcome contradictions, inconsistencies and inefficiencies with the use of IT artefacts (Mesgari & Okoli, 2019), such as business analytics in this case, to enact their newly acquired sense (Zamani et al., 2019) and make their everyday practices and decision making more orderly.

In the next section, we discuss further on our approach and its applicability in the area of business analytics project and portfolio management.

2.3 Making Sense of and with Business Analytics

Sensemaking, as espoused by Weick, is a processual action-orientated phenomenon (Weick & Sutcliffe, 2007) and an information-processing endeavour (Abbasi et al., 2018; Weick, 2010), where information is drawn from the internal and the external environment of the organisation (e.g., business strategy, identity, working practices, organisational culture) (Mesgari & Okoli, 2019), the information systems and technologies in use (Seidel et al., 2017), and the individual experiences and personal beliefs (Zamani et al., 2019), to name only a few information sources. Along these lines, sensemaking is triggered in times of uncertainty or ambiguity, where the aim is to instil order into what is perceived chaotic. A preliminary stage of sensemaking is that of noticing and bracketing. Noticing and bracketing draw from prior experiences and one's expertise, and relate to potential antecedents and consequences of what is being observed (Weick et al., 2005). In this sense, noticing and bracketing further support the sensemaker with simplifying what is being observed and developing plausible stories for explaining it (Seidel et al., 2017). The next stage is that of labelling and categorising. At this stage, individuals begin abstracting from perceptually-based knowing to categorically-based knowing (Weick, 2010), in order disregard any differences that prohibit them from finding a common ground (Weick et al., 2005). Once common ground has been achieved, the next step is to identify what will be the immediate action, by assessing and reviewing the different plausible outcomes (Seidel et al., 2017).

Positioning the above discussion within the broader discourse of project management, project prioritisation and business analytics in which we are interested, sensemaking can be seen as the social, organisation-wide process whereby individuals collectively embark upon the interpretation of the insights received from the business analytics tools in order to manage and evaluate existing and future projects, with the aim to decide on corrective actions and future implementations. From then on, sensemaking during projects and software projects in particular is transversal by definition, because most typically projects are unpredictable and multifaceted (Dennehy & Conboy, 2019), offering the required degree of uncertainty and ambiguity for triggering sensemaking. Adding business analytics into the mix, we notice that these are used to support decision making, i.e., action, which, nevertheless, requires somewhat more than what business analytics can offer: it requires contextual information that needs to be coupled with the business analytics output, and these together need to be interpreted and made sense of against the backdrop of the prevalent problematic situation that needs to be tackled (Ashrafi et al., 2019; Conboy, Mikalef, et al., 2020; Constantiou et al., 2019; Fosso Wamba et al., 2015; Mikalef et al., 2020).

During project work, or during project selection, business analytics can alleviate some of the ambiguity and the uncertainty and we expect that this is where part of their value lies (Conboy, Dennehy, et al., 2020). They can support immensely the stage of noticing and bracketing by pulling together critical information that could pass otherwise unnoticed, and help businesses simplify what is happening, while offering a pathway towards identifying antecedents and consequences when businesses and project teams are able to contextualise the insights they receive. On that basis, labelling and categorising suggests specifying further under different categories the results of the previous stage, which can be beneficial for project selection (e.g., categorising projects based on their relative importance (Tavana et al., 2013), such as 'critical', 'important', 'strategic' and so on).

Approaching business analytics this way opens up several possibilities. On the one hand, business analytics help businesses make sense of their data and their operations in order to proceed with their decision making along a number of fronts. On the other hand, as businesses use business analytics, combined with intuitive judgements and prior experiences, in order to evaluate alternative scenarios and action possibilities, they may combine business analytics insights together with their own personal experiences and intuitive judgements, they can use the process itself and its output to fine tune the design of the tools themselves on the basis of tangible results.

3   Methodology

We believe that within a contemporary business environment, the use of technology, in this case of business analytics, the working practices of software developers, managers and decision makers, the multiple stakeholders' views, and the interplay of multiple actors, are tightly interrelated to each other within a contextual, socially embedded process. In such a context, process and outcomes are interwoven with the organisational culture and the team dynamics, both of which are determinants for the success of project management and higher order decision making processes, such as project prioritisation and project selection (Igira, 2008; Walsham, 2002).

As the aim of our study is to explore and understand how business analytics support businesses learn and improve their decision making through the lens of sensemaking, we adopt an interpretive approach. Interpretivism allows us to address this without manipulating the actors' behaviour, while assessing the multiple contextual conditions (Walsham, 2006).

Along these lines, we follow the design of the case study and we present the findings of two case studies we conducted with the help of two small Greek start-ups. These two cases are discussed in the next sections.

3.1   Case Study A: RetailAnalytics

RetailAnalytics is a small start-up that provides market research and marketing solutions on the basis of location data drawn from different data sources. It has developed a mobile application used by consumers to discover items and receive rewards by brands and retailers as they travel across the city. The team behind RetailAnalytics comprises by 6 core team members: its CEO and General Director, a back-end developer, two front-end developers, a data scientist and an operations manager. Their clients are various retailers ranging from grocery stores to small cafeterias, and major food suppliers. Currently, RetailAnalytics provides consulting and ad-hoc analytics services and reports for their clients. These reports are mostly pre-defined and exploit both descriptive and data mining analytics, including market research results based on specific questions asked, user segmentation and profiling based on users' mostly visited areas and stores, areas correlation, footfall reporting etc. At the same time, they generate analytics reports and develop custom features for their mobile application based on their client needs. Recently they received funding from a venture capital fund, to develop a real-time business analytics platform having predicting capabilities for their B2B (Business to Business) customers. The company's CEO noticed that their clients' demands for customised features and reports distracts the company from their core activities and the funding purpose, although, due to revenue and customer retention purposes, they should keep working on feature customisation. Up until now, RetailAnalytics CEO prioritises and decides the criticality of developing a new feature, based on his estimations about the profitability of similar previously released features. He follows the same approach in deciding the features they are currently developing for their B2B analytics platform. As this approach is highly dependent on intuition and rough estimations, at the moment they are in the process of developing a new feature in their business analytics platform for themselves. Their goal is to assess and measure the success and profitability of each feature they release within their application. Their vision is to use this new business analytics tool to aid them in prioritising and deciding the features to be developed for their new B2B business analytics platform, as well.

3.2   Case Study B: SocialAnalytics

SocialAnalytics is a small start-up that started its operation in 2014 as a research and development spin off of a government funded project. Since then, it has received funding from multiple entrepreneurship competitions and has received awards and distinctions. At the time of our study, the core team of SocialAnalytics included five people: the Managing Director, a Data Scientist, the Lead Software Engineer, the lead for Operations and Presales and the lead for Communication and Reporting. Its portfolio of services includes sentiment analysis, real-time monitoring and competition tracking, using primarily online social media data. SocialAnalytics provide these services via their bespoke platform

and can offer additional services depending on the specific needs of the client. Their clientele includes major financial institutions, international corporations of different sectors, consulting services, including investors and some smaller businesses. While most of their major clients have been with them for a long while, their work is most typically project-based and treated as such with everything this entails with regards to project management, monitoring, costing etc. In addition, the Managing Director have been noticing recently that not all projects return the same profit when controlling for effort, suggesting that there were discrepancies and slippages in how they have been monitoring and controlling their work. This is why SocialAnalytics turned to business analytics methods themselves and in order to make more effective decisions in the future. Their business analytics solution is not as advanced nor as sophisticated as their analytics platform they use for their clients, as they didn't put too much thought in setting it up, but for them and for now it seems to work.

3.3 Data Collection and Analysis

For our study, we will collect data through semi-structured interviews with all team members from the two start-ups. We will also collect data from additional sources, such as documents, the businesses' websites, role descriptions and the likes for triangulation purposes (Eisenhardt, 1989). Interviews will be recorded, transcribed and coded through Nvivo. For the purposes of data analysis, we will use grounded theory method techniques, and specifically the Glaserian approach of open coding and selective (Glaser & Strauss, 1967). As our aim is not to build theory but rather offer a rich description, we will be skipping the stage of theoretical coding (Urquhart, 2012). We expect that our major themes and selective codes will evolve around the stages of sensemaking, i.e., noticing and bracketing, labelling and categorising, as well as themes pertaining to project management and project selection, i.e., timing, costing, quality, etc.

4 Expected Contributions

The aim of this study is to explore and understand how business analytics support businesses learn and improve their decision making through the lens of sensemaking. We will specifically using two cases of start-ups, whereby the first is using business analytics in order to assess the profitability of their projects as these unfold but also retrospectively, and therefore improve their planning and effectiveness in the future, and the second is using business analytics in order to measure the relative success and profitability of each feature they roll out within their application.

On the basis of our findings, we expect both theoretical and practical contributions. Our focus is specifically around how businesses make sense with and of business analytics in order to learn and improve their decision making, and we are interested in seeing how the actions of various individuals, enacted during the sensemaking process, inform the sensemaking of their peers. As such, from a theoretical perspective, we will be focusing on the materiality of the technology, in this case that of business analytics, and we will be adopting and action orientation stance, both of which have been identified as shortcomings within the Information Systems field in relation to sensemaking studies (Mesgari & Okoli, 2019). With regards to practice, and the business analytics literature specifically, on the basis of addressing our aim, we will be gaining insights into how start-ups use business analytics during the different phases of development, how projects shape and are being shaped by business analytics tools, and in turn, what kind of value these tools add to project management. These findings will be of direct benefit to the literature.

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