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The Role of Business Analytics Capabilities in Enabling Competitive Advantage for SMEs

Selen Esra Dereli
Swinburne University of Technology, sdereli@swin.edu.au

Axel Korthaus
Swinburne University of Technology, akorthaus@swin.edu.au

Helana Scheepers
Swinburne University, hscheepers@swin.edu.au

Ashir Ahmed
Swinburne University, azahmed@swin.edu.au

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Selen Esra Dereli

Swinburne Business School | Faculty of Business and Law
Swinburne University of Technology
Melbourne, Australia
Email: sdereli@swin.edu.au

Axel Korthaus

Swinburne Business School | Faculty of Business and Law
Swinburne University of Technology
Melbourne, Australia
Email: akorthaus@swin.edu.au

Helana Scheepers

Swinburne Business School | Faculty of Business and Law
Swinburne University of Technology
Melbourne, Australia
Email: hscheepers@swin.edu.au

Ashir Ahmed

School of Arts, Social Sciences and Humanities | Faculty of Health, Arts and Design
Swinburne University of Technology
Melbourne, Australia
Email: azahmed@swin.edu.au

Abstract

Over the last decades, Business Analytics (BA) has gained increasing importance. Research into BA has shown how BA contributes to business value (e.g., competitive advantage) and performance, but the research predominantly was conducted in large organizations. Although Small and Medium Enterprises (SMEs) constitute a significant proportion of enterprises globally, the studies of how SMEs engage with BA and gain competitive advantage from BA is scarce. This research addresses this gap, explore and better understand the role of BA capabilities in enabling SMEs to create competitive advantage. It employs Resource-Based View (RBV) as a theoretical underpinning and uses a qualitative case study approach. Finally, this paper concludes by presenting BA capabilities categorised based on SMEs' perspectives. It also highlights the importance of having a better understanding of BA capabilities, and how this deep understanding can help academic researchers and industry practitioners in enabling competitive advantage from their use of BA.

Keywords Business Analytics (BA), BA Capabilities, competitive advantage, Small and Medium Enterprises (SMEs)

1 Introduction

The importance of technology as an essential enabler of competitive advantage in large organizations is well documented in the literature (Gronum 2015; Mata et al. 1995; Ngah 2015). However, how Small and Medium Enterprises (SMEs) can effectively utilize their technology investments to realize competitive advantage has been less well studied. Further, in some instances, the practices of enabling competitive advantage from technology investments in large enterprises have been applied to SMEs without considering how large organizations and SMEs differ in terms of their characteristics, e.g., concerning flexibility, capabilities, management style and agility (English and Hoffman 2018). However, these differences in SMEs' characteristics can play a significant role in how they use their resources to enable competitive advantage (Cosic et al. 2015; Llave et al. 2018).

Over the last decades, one area of technology investment that has become increasingly important is Business Analytics (BA) (Krishnamoorthi and Mathew 2018). It has been identified as the most preferred technology by managers (Gartner 2018). However, despite the empirical evidence that BA is a strategic resource potentially contributing to competitive advantage, SMEs have not yet adopted it well (Llave et al. 2018). Many researchers have dedicated their efforts to developing models to answer how BA contributes to business performance and value (e.g., competitive advantage) for large organizations (Krishnamoorthi and Mathew 2018; Seddon et al. 2017). Llave et al. (2018) dedicated their effort to develop a framework of how BA can create value for SMEs with insights gained from experts, and studied BA investment strategy by SMEs. Llave et al. (2018) suggested that future research should assess SMEs' capabilities for BA and has noted that the different characteristics of SMEs will impact how SMEs create a competitive advantage compared to large organizations. One way of addressing this issue is to explore how SMEs' BA capabilities enable competitive advantage from the perspective of them.

This paper is motivated by SMEs' increase investment in BA rooted in SMEs affordable access to BA resources. Using BA resources requires a deeper understanding of capabilities and assets that constitute these resources (Krishnamoorthi and Mathew 2018). BA capabilities are defined as the skills needed to utilize BA assets in order to perform a certain BA related task (Krishnamoorthi and Mathew 2018; Wade and Hulland 2004). Many SMEs have made investments without a deep understanding of BA resources, and they cannot be in a position to use their BA resources well enough to enable competitive advantage. To explore the mechanism by which SMEs gain potential competitive advantage through BA resources, BA capabilities and assets need to be explored. Since BA assets are easy to access but BA capabilities are hard to develop, BA capabilities play a significant role in gaining competitive advantage through BA resources. Hence, SMEs' views on BA capabilities need to be explored. This paper aims to address the following research question: How do SMEs utilize BA capabilities in enabling competitive advantage?

2 Business Analytics

Business analytics (BA) has emerged as an essential area of study for both practitioners and researchers in the last decade and has been used as a broader concept to encompass related terms, such as Business Intelligence or Business Intelligence and Analytics (Chen et al. 2012). However, BA is generally defined as *"a set of systems, techniques and technologies which analyse data to support an enterprise to better understand its business and market"* (Chen et al. 2012, p. 1166).

Projects that consider the use of BA resources are organized around questions to which data may provide the answers and which can enable SMEs to gain an advantage over competitors. This differs from traditional projects, which are organized around defined tasks, plans and outcomes. While conventional IT (Information Technology) projects focus on goals such as improving efficiency, reducing costs and increasing productivity with defined tasks and plans, a project involving the use of BA changes the way enterprises think and use data for operational and strategic decisions; it relies less on managers' assumptions and biases (Krishnamoorthi and Mathew 2018). Unlike traditional approaches (e.g., defined tasks and plans), the use of a BA approach involves creating a decision-making strategy and seeking unique insights that enable the enterprise to serve stakeholders better than what competitors can do (Krishnamoorthi and Mathew 2018; Marchand and Peppard 2013). However, SMEs often have limitations associated with their greater dependency on individuals (generally the owners) making key decisions (Man et al. 2002). Therefore, the management style in SMEs differs from larger enterprises (Coyte et al. 2012).

Consequently, an investment in BA assets can change the way SMEs make decisions and replace the managers' assumptions and biases with evidence-based data. However, to achieve this and enable competitive advantage, SMEs need to understand how to best use these BA assets, i.e., they need to build BA capabilities (English and Hoffman 2018; Krishnamoorthi and Mathew 2018). SMEs' characteristics

(i.e., limited skills, lack of resources, etc.) entail that their BA capabilities are often different to and more limited than those of large enterprises. BA capabilities as the skills needed to utilize BA assets in order to perform a certain BA related task (Krishnamoorthi and Mathew 2018; Wade and Hulland 2004) are grouped into four capability areas based on their similarities (i) governance, (ii) culture, (iii) technology and (iv) people (Cosic et al. 2015).

(i) Governance: This is defined as the mechanism for managing the use of BA resources in organizations and specifying the decision rights to align BA resources with the objectives of an organisation (Cosic et al. 2015). Governance also involves renewing BA resources to take advantage of development in technology and respond to changes in the competitive business environment (Collis and Hussey 2013; Shanks and Bekmamedova 2012). It also involves managing change to mitigate resistance (Williams and Williams 2010).

(ii) Culture: This is defined as organizational values and behaviours that form over time, leading to systematic ways of gathering, analysing, and disseminating data (Leidner and Kayworth 2006). Culture impacts the way decisions are made and the degree to which daily tasks involve BA tasks (Davenport 2018). It also influences acceptance of the change (Cosic et al. 2015).

(iii) Technology: This refers to hardware, software and data used in BA activities (Cosic et al. 2015). Technology includes data resources integrated into organization management and information systems (Davenport 2018), reporting and dashboards (Watson and Wixom 2007) and statistical analysis, thus helping to achieve business objectives (Negash and Gray 2008).

(iv) People: This refers to all employees working in an organization and using BA as part of their job (Cosic et al. 2015). If a task involves BA, it needs to be considered a knowledge-intensive task. Therefore, employees who undertake BA related tasks will require specials skills such as technical, business and managerial skills (Davenport 2018).

The classification of BA capabilities provided by Cosic et al. (2015) is based on a review of 51 papers that are mostly focused on large organizations and their BA capabilities. But the sub-areas of these BA capabilities areas can be conceptualised differently in SMEs as SMEs have different characteristics. Hence, this different conceptualisation can impact SMEs' enabling of competitive advantage from BA. This paper aims to explore SMEs' BA capabilities and how these BA capabilities play a role in enabling competitive advantage.

3   Competitive Advantage of SMEs

The concept of competitive advantage has been researched, directly or indirectly, in many studies. Porter's (1980) seminal work is the starting point for most discussions on the concept of competitive advantage and competitive advantage theories, described in terms of a transformation of the value chain. Following Porter's (1980) work, Barney (1991) approached the debate on competitive advantage by focusing on a firm's strategic resources. He argued that an enterprise gains competitive advantage "*when it is implementing a value-creating strategy not simultaneously being implemented by any current or potential competitors when these other firms are unable to duplicate benefits of this strategy*" (Barney 1991, pg. 102) and formulated the corresponding Resource-Based View (RBV) theory. According to RBV, strategic resources with specific resource attributes, namely validity, rarity, in-imitability and non-substitutability, can enable competitive advantage (Barney 1991). Since this paper acknowledges BA resources as a strategic resource of SMEs, it adopts RBV as an underpinning theoretical lens to explore the role of SMEs' BA capabilities in enabling competitive advantage.

As pointed out above, the characteristics of SMEs, e.g., regarding flexibility, management and entrepreneurship (Buckley and Chatterjee 2012; Guarda et al. 2013), often differ significantly from those of large enterprises. While these characteristics can potentially help SMEs gain a competitive advantage, they can also create issues if not utilized effectively. For example, according to English and Hoffman (2018), if SMEs have data in a precise form that meets users' requirements, they can strategically process the data with their BA resources to enable competitive advantage. However, SMEs have limited capacity to convert data into a form that fulfils these requirements. Another challenge to enabling a competitive advantage of SMEs is the lack of transparency and knowledge about BA resource usage in the SMEs' market (English and Hoffman 2018). SMEs with little or no experience using BA may face a challenge in understanding how they can use their BA resources (i.e., BA assets and BA capabilities) to enable competitive advantage (English and Hoffman 2018).

4   Research Design and Method

This study employs an exploratory case study approach. It applies inductive reasoning to empirical data to answer the research question. Furthermore, since this study aims to have in-depth insights on the use of BA from the SMEs' view, semi-structured interviews were selected as the primary data collection method. In addition to using semi-structured interviews, documentations are used as a secondary data collection method to improve the validity of this study by making data triangulation possible.

In order to explore the way SMEs use BA capabilities to enable competitive advantage, 18 SME managers have been interviewed to date. The 18 participants are from 12 different SMEs of different sizes (i.e., micro, small, medium), 7 different industries (i.e., professional services, logistics etc.) and were actively using BA in their daily tasks. These 7 different industries are selected from the top 10 industries listed in the Australian Bureau of Statistics (2019) 's count of Australian enterprises including entries and exits list. The reason for choosing different industries and sizes of SMEs was to gain a deeper understanding of the use of BA capabilities in SMEs and provide a better opportunity to explore potential similarities and differences across SMEs operating in the Australian industry in greater depth.

	Employee #	Size	Industry	Interviewees #	Role of Interviewees
Case 1	2	Micro	Logistics	1	Managing director
Case 2	13	Small	Hospitality	1	Financial controller
Case 3	70	Medium	Professional services	3	CEO, COO, General Manager (GM)
Case 4	9	Small	Fitness	2	Owner, manager
Case 5	20	Medium	Education	2	GM, delivery manager
Case 6	10	Small	Professional services	2	CEO, delivery manager
Case 7	6	Small	Real Estate	1	Manager
Case 8	46	Medim	Logistic	1	General manager
Case 9	10	Small	Fitness	1	Managing director
Case 10	19	Small	Professional services	2	Operation manager, General manager
Case 11	10	Small	Hospitality	2	Supervisor, manager

Table 1. Overview of Cases

The selected eighteen key informants worked in SMEs operating in Australia (see Table 1). They actively use BA in their everyday work and held various positions, including general manager, owner, chief executive officer, etc. The interview questions focused on participants' use of BA resources (i.e., BA assets and capabilities) and competitive advantage and included general questions regarding participants' background on BA. Each interview was recorded and transcribed. Transcribing each interview facilitated familiarization with data, which is the first step of thematic analysis. Thematic analysis is described as "a method for identifying, analyzing, and reporting patterns within data. It minimally organizes and describes the data set in (rich) detail. However, it also often goes further than this and interprets various aspects of the research topic" (Braun and Clarke 2006, p. 6). Since this study follows an exploratory qualitative approach and applies inductive reasoning to identify new trends from the data set, thematic analysis is an appropriate data analysis method. In order to achieve the second step of thematic analysis (i.e., generating initial codes), Nvivo was used as a semantic tool to generate codes from interview transcriptions. Each generated code was placed in a Miro board to sort these codes into potential themes as part of the third data analysis step (i.e., searching for themes). If the generated codes were repetitive, they led to developing themes. Finally, the developed themes were assessed using the Miro board to see "if the themes work in relation to the coded extracts and the entire data set, generating a thematic map" (Vaismoradi, Turunen & Bondas 2013, p. 402). This step addressed the requirements of the fourth step of data analysis (i.e., reviewing themes). Following the fourth step, in step 5 (i.e., defining and naming themes), a proposition was created for each generated theme, summarising the SMEs' perspectives on enabling competitive advantage from BA. These propositions

can lead to hypotheses that can be tested in future research. The final sixth step of data analysis involves producing a report for the outcomes of the data analysis. The next section outlines the BA capabilities insights that emerged from the thematic analysis.

5   Analysis and Discussion

In this research, it is hypothesized that tangible BA resources that SMEs can now get access to may not be much different from those that other competitors or even large organizations employ, so they are not necessarily significant contributors to enabling competitive advantage. On the other hand, BA capabilities can provide competencies that cannot be easily reproduced, and therefore facilitate SMEs' creation of competitive advantage. Consequently, this study identifies the BA capabilities that SME managers believe have been useful in gaining a competitive advantage when they have adopted BA resources. Moreover, according to the literature, this study aims to explore and evaluate the relevance to SMEs of BA capabilities that larger organizations have developed. The significance of the capability areas described above (i.e., governance, culture, technology and people) and associated BA capabilities in the context of SMEs will be discussed in detail below.

(i) Governance: As understood in the context of large organizations, governance as a capability area refers to the mechanisms that ensure and control the effective use of BA resources. According to Cosic et al. (2015), governance as a capability area comprises four BA capabilities, namely decision rights, change management, strategic alignment and dynamic BA capabilities. However, the data from our study suggests that SMEs take a narrower view of governance to focus specifically on data governance. Data governance from the perspective of the participants can be defined as setting up structures to enable company-wide use of BA resources, indirectly contributing to create competitive advantage. A participant explained this as follows *"Governance [is] tremendously important and [it is an] important key to success as it involves business engagement. Therefore, you obviously need engagement skills to [develop the data governance]."* In addition, to negotiating a governance structure, the participants identified that the structure is refined over time through trial and error. The learning gained through the trial-and-error process leads to the development of unique skills that others cannot easily imitate.

(ii) Culture: "Culture" refers to tacit and explicit values and behaviours in organizations. The skills and knowledge required to plan and improve organizational culture are defined as the culture capability area. In the context of BA, capabilities subsumed under the culture capability area include evidence-based management, embeddedness, executive leadership and support, and flexibility and agility (Cosic et al. 2015). Yet, data from our study shows that the SMEs have a rather specific view of the culture capability area. SMEs believe that a BA capability related to culture focuses on being the owner of data who can create transparency in their organization. Transparency in an organization from the perspective of participants can be defined as operating in a way that is open for others to see progress. A participant summarized this as follows: *"We wanted to be [a] data-driven organization to have a single tool [to make our decisions]. We have started [with the] basics, such as reports, dashboards, and become more sophisticated. We expanded our capabilities to have a culture to manage and sort all information we have."* In addition to expressing the importance of transparency, the participants identified that change management (which would fall under the governance capability area) is an important skill for SMEs and point out how it relates to transparency. Consequently, change management skills lead to increased organizational effectiveness and building a great sense of trust. A participant explained the significance of trust as "*When you create such a transparent environment, there has been a great sense of trust. By exposing all that data [you own], you use them to create trust, not [as] a hammer to your employees, and [this transparent culture] can be fundamental to enabling competitive advantage*".

(iii) Technology: The BA technology capability area refers to the effective and efficient development and use of data, software and hardware. Data management, system integration, reporting BA technology, and discovery of BA technology are the four major capabilities grouped within this capability area (Cosic et al. 2015). Although data from our study show an overlap between elements of data management capabilities of large organizations and SMEs, SMEs have distinctive BA capabilities related to talent management and technical knowledge. Talent management is defined as a process of professionally developing employees with the required technical skills. The second capability emphasized by SMEs in this context points to employees' technical knowledge. A participant explained: "*[Technical knowledge] is not the thing that would come first. But you still need these capabilities to master whatever [BA resources] it is that you have decided.*" In addition, the participant highlighted that knowledge is owned by an employee. Therefore, the competencies to understand the required technical skills for the organisation can be grouped in the BA technology skills. This understanding

directly leads to developing the strengths of an organization and contributes to enabling competitive advantage.

(iv) People: "People" refers to employees, and in the context of BA, the people capability area refers to employees who use BA as part of their daily tasks. In the context of BA, the people capability area divides into four BA capabilities, technology skills and knowledge, business skills and knowledge, management skills and knowledge, and entrepreneurship and innovation (Cosic et al. 2015). However, data from this study indicate that SMEs take a more specific view of the people capability area and see it as the most important area of BA capabilities. According to SMEs, their BA capabilities are employees' soft skills and experience. Soft skills are known as skills which are desirable in all professions, such as communication skills, customer management skills. A participant explained this as follows: "*One is internal skills like soft skills, such as communication skills and empathy, second, how you use these soft skills for [your customer] to choose your services*". The participant identified that soft skills are unique, based on people's strengths. Therefore, they cannot easily be substituted for competitors. Hence, the inimitableness of soft skills can result in enabling competitive advantage. Further, experience in the use of BA is identified as another important BA capability for the people capability area and it is explained by the participant "The experience that an employee has in the use of BA in the organization". Moreover, the BA capability of experience an organisation possesses also involves experience in the use of BA in the same organization. This experience can create business knowledge aligned with the strategic values of organizations. 18 out of 18 participants highlighted that the people capability area is the most important capability area for the achievement of competitive advantage from BA capabilities. They agree that the people capability area is indispensable to upgrading their business because of their values, which creates a competitive advantage. A participant stated, "*Your people and their knowledge in the business is a critical success factor. It is a competitive advantage over others.*"

As a result, regardless of whether they had achieved competitive advantage or not from the use of BA, each participant recognized that whichever BA resources are used by an organization, if they have a good understanding of the people BA capabilities, they are in a stronger position to enable competitive advantage.

6   Conclusion

This paper has explored how SMEs use BA capabilities in enabling competitive advantage. Based on the literature review on BA capabilities in large organizations and in-depth interviews eliciting empirical data about BA capabilities in SMEs, this paper concludes that SMEs' BA capabilities differ from large organizations. While this paper finds that these differences in BA capabilities play a significant role in enabling competitive advantage for SMEs, it hasn't shown how this can be achieved. However, it argues this understanding can be accomplished by exploring BA capabilities and showing the importance of BA capabilities in achieving competitive advantage.

As the existing competitive advantage theories (i.e., RBV, dynamic capabilities) lack a detailed view of how to enable competitive advantage from different resources (i.e., BA resources) and do not particularly focus on any enterprises (i.e., SMEs, large organisations), this paper's outcomes can be considered a contribution to the body of knowledge on the competitive advantage of SMEs and BA. In addition to the theoretical contribution of this study, it also contributes to IS practice. By following the categorization of BA capabilities developed by Cosic et al. (2015), this study explores and reflects the actual practice of the SMEs' BA capabilities. Consequently, it provides a rich understanding of SMEs' BA capabilities that allows practitioners to understand and manage their BA capabilities effectively to achieve competitive advantage by using their BA resources.

This paper is part of a larger study that is expected to establish how SMEs can utilize their BA resources effectively when they are aiming to achieve a competitive advantage. On the other hand, this paper has limitations. Since it is research in progress, it presents preliminary results only based on the 18 interviews conducted to date. However, the preliminary results involve the contextual information of SMEs' views on BA utilisation and empirical evidence on BA capabilities gathered from the existing 18 interviews which have approached data saturation.

These preliminary results involve the contextual information of SMEs' views on BA utilisation. Although empirical evidence on BA capabilities gathered from the existing 18 interviews approached data saturation, this study plans to hold 2 further interviews shortly. It is anticipated that these 2 interviews will be beneficial to data saturation and analysis. The preliminary results developed in the study assume a causal relationship between BA and competitive advantage. This causal relationship posits that SMEs can gain a competitive advantage from their BA capabilities. Although data gathered in this study

supports this assumption, it still requires more research to test the generalizability of the findings. Although this research was conducted in the Australian context, most participants were professionally educated overseas or had international professional experience in different countries before migrating to Australia. Therefore, the findings may apply internationally to SMEs in a similar position to those in this study.

7   References

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