The impact of resource constraints on the adoption of data analytics technologies within not-for-profit organisations

Abstract: In the digital transformation era, commercial organisations are using the digital footprints captured in their systems to analyse consumer behaviours to provide personalised services and gain competitive advantage. Such data analytics practices have only been made possible due to advancements of technologies to capture, store, and analyse big data. Nevertheless, small and medium enterprises are lagging their larger counterparts in digital transformation. Some of the reasons are due to lack of financial resources, knowledges, and skills. Further down the value chain are the not-for-profit organisations, who are facing more severe shortages of resources, yet their influences are becoming more significant as they are consuming more national resources. In addition, it requires different strategies to implement digital transformation and data analytics within not-for-profit organisation, as compared to their commercial counterparts. This article uses a case study approach to investigate the challenges that not-for-profit organisations are facing in Singapore, in the context of data analytics technologies adoption. In particular, this study focuses on resource constraints within such organisations. The knowledge gained from this research is expected to assist not-for-profit organisations in kick-start their data analytics strategies.

Introduction

Many organisations are using data to create new business models and gain competitive advantage; such business models use data from different organisational divisions i.e., marketing, customer services, manufacturing, operations, and supply-chain management (Marr, 2016; Provost and Fawcett, 2013). Accordingly, some of the new start-ups have used data analytics to disrupt the conventional business models (Gartner, 2018; Lin, 2014; Provost and Fawcett, 2013) since well-executed data analytics strategies can provide valuable insights that enable organisations to perform better-targeted marketing, cross-selling and online advertising (Provost and Fawcett, 2013).

As data analytics strategies are affecting all industries and geographical areas (Gartner, 2018), it is important that small organisations get onboard the bandwagon to reap the advantages of technology advancements (Lin, 2014). However, with limited resources and know-how, such organisations need guidance and support to catch up with the technology advancements. This study attempts to explore the challenges that small, not-for-profit organisations are facing when they embark on data analytics strategies.

The paper is structured as follows: Next section outlines the study rationale. Subsequently, the existing narratives and research are outlined in the literature review section. This is followed by the methodology section. The inferences are provided within the findings discussion section. The paper is bookended with a conclusion.

Study Rationale

Adopting data analytics strategies can help organisations generate new ideas, services, and products to serve customers through a new business model (Yeo and Carter, 2017; McAfee and Brynjolfsson, 2012). Instances of such data-driven strategies can be observed among several successful firms such as Uber (Marr, 2016), Amazon, and MasterCard (Lin, 2014). Organisations that use data analytics to gain competitive advantage outperform their peers (Marshall, et al., 2015). However, the pace of digitalisation is not even, as small firms, who have considerably lesser capital and knowledge, are lagging behind their bigger counterparts (OECD, 2018).

In the sphere of small and medium enterprises, the small, not-for-profit organisations face bigger challenges, in terms of capital and knowledge, than the small, commercial organisations.

Not-for-profit organisations are not profit-oriented (Henke, 1972), and usually do not have equity shares. Instances of not-for-profit organisations are professional bodies, charitable and religious organisations, universities, voluntary agencies, social services, associations, clubs, and unions (Newman and Wallender, 1978; Henke, 1972).

Although making profit is not the objective, they must embrace digitalisation and data analytics, as those who do not are at risk of becoming obsolete (DBS, 2018).

This research paper is important because:

- Knowing the challenges that small, not-for-profit organisations are facing can help them to devise better strategies to launch data analytics,
- The implications of digitalisation are frequently overlooked by not-for-profit organisations (Eusanio and Rosenbaum, 2019),
- The impacts of technologies on not-for-profit and commercial organisations are different (Kilbourne and Marshall, 2005). Therefore, data analytics implementation strategies must be adapted for not-for-profit organisations (Newman and Wallender, 1978). Yet, there is little research on the impacts of technologies on not-for-profit

organisations (Kilbourne and Marshall, 2005).

- The study can assist small not-for-profit organisations in Singapore to appreciate the challenges in data analytics technology adoption, and can potentially help them to identify strategies for overcoming such challenges.

This research paper aims to fill the research gaps by ascertaining the challenges encountered by not-for-profit organisations, because they are gaining influence and consuming a greater proportion of resources.

Literature Review

Digital data are being collected at unprecedented volume (Lemieux, et al., 2014; LaValle, et al., 2011), and commercial organisations who adopt data analytics strategies are performing better than those who have not (Microsoft and ASME, 2018; Marshall, et al., 2015; LaValle et al., 2011). Therefore, organisations must incorporate data analytics at both strategic and operational levels, and prepare their workforce to embrace such strategies (Segarra, et al., 2016).

Despite the importance of data analytics strategies, the small and medium enterprises, in general, are lagging in their pursuit of the strategies (Shvkumar,

2019; Coleman, 2016), leading to potential widening of wage gaps between them and the larger firms (OECD, 2018).

There is no standard definition for small and medium enterprises (OECD, 2017; Ogbuokiri, et al., 2015). In Singapore, they are generally defined as those with revenue lesser than SGD100 million or employment lesser than 200 workers (MTI Singapore, 2013). Collectively, the small and medium enterprises are an integral part of the Singapore economy, as they contribute approximately half of Singapore's gross domestic products (GDP) and employ two-thirds of the country's workforce (Microsoft and ASME, 2018). Lin (2014) argued that data analytics should not be confined only to large organisations.

It is widely accepted that data analytics can bring a competitive advantage to small and medium enterprises (DBS, 2018; Pan and Sun, 2018; Ogbuokiri, et al., 2015). Some of the benefits are creating new business opportunities and products (Pan and Sun, 2018; Ogbuokiri, et al., 2015), reaching out to new customers (Ang, 2021), providing a better customer experience (DBS, 2019; Alibaba Cloud, 2018), improving productivity (Alibaba Cloud, 2018), enhancing processes (Ang, 2021),

earning higher profit (DBS, 2019), leading to better decisions (Pan and Sun, 2018; Ogbuokiri, et al., 2015), and enhancing risk management and compliance capabilities (Pan and Sun, 2018).

One segment within the small and medium enterprises is the small, not-for-profit organisations, where research gaps exist on the impact of technologies on such organisations (Eusanio and Rosenbaum, 2019).

Research Methodology

This research paper adopts a case study, qualitative research methodology, and semi-structured interview as the main data collection method.

Case study research is selecting data from a specific entity or unit among a larger class of similar entities or units for analysis (Marrelli, 2007; Gerring, 2004; Tellis, 1997). Case study research is adopted because it provides a richness of data (Lee, et al., 2007) for researches that focus on the real-life phenomenon (Yin, 1984). It is also suitable for exploratory researches (Tellis, 1997), when little prior knowledge exists (Dasgupta, 2015; Marrelli, 2007).

Qualitative research methodology is selected, because it is typically

explorative (Dasgupta, 2015) to develop understanding when little knowledge and prior research are available (Kerr, et al., 2010). Furthermore, it is a proposed method to ascertain attitudes, and perceptions of the participants (Kerr, et al., 2010) by telling the stories from their perspectives (O'Day and Killeen, 2002), which this paper aims to achieve. Last but not least, qualitative research complements case studies (Gummersson, 2007).

Semi-structured interview is chosen to be the main data collection method because it is aligned to case study (Tellis, 1997) and qualitative research works, which tend to be exploratory (Azorin, 2007). The interview questions are designed to focus on the challenges that the participants perceived to be barriers to implementing data analytics strategies in their organisation. In designing the interview questions, the authors have considered the general barriers noted in the literature review.

Lastly, as the case study organisation is a small not-for-profit organisation, the purposive sampling method, which is generally used for qualitative research (Kerr, et al., 2010), is adopted. Statistical sampling is not feasible as the organisation employs only 11 staff.

For this research work, 9 participants are recruited for the interviews, with each participant taking part in 2 rounds of interviews. The first round is to solicit their views on the challenges. Their views are confirmed during the second interview, which acts as triangulation.

Challenges for Small and Medium Enterprises to Implement Data Analytics Strategies

Although there are numerous benefits attributable to data analytics strategies, small businesses are lagging behind their larger counterparts in embracing digital transformation (Ang, 2021; OECD, 2017). The slower take-up rates among the small and medium enterprises are due to roadblocks such as:

- Implementation of data analytics strategies is perceived to be complex and expensive for small and medium enterprises where financial resources are generally lacking (Microsoft and ASME, 2018; Ogbuokiri, et al., 2015; OECD, 2000). Some have perceived data analytics to be suitable only for large organisations (Ogbuokiri, et al., 2015),
- Due to the lack of awareness, especially at the owners and top management levels (Ogbuokiri, et al., 2015), there is little interest (Coleman, 2016) and leadership

supports (Ogbuokiri, et al., 2015) to implement data analytics,

- The lack of awareness throughout the organisations has led to fear and resistance to changes, especially when the organisations are not data ready (Shvkumar, 2019),
- There are shortages of IT, and statistical skills (Coleman, 2016) as well as managerial expertise (Coleman, 2016; Ogbuokiri, et al., 2015).

Summarising the key challenges that contribute to the failures in launching data analytics strategies in small and medium enterprises are:

- Lack of financial resources,
- Lack of leadership supports,
- Lack of knowledge about data analytics strategies and their capabilities,
- Resistance to changes,
- Skill shortages.

The above barriers were derived following a comprehensive narrative extraction from the literature review. The list was used to devise the semi-structured interview questions. The interviews were transcribed and sent to the participants for confirmation prior to analysis.

Key themes of the challenges were identified by analysing the interview transcripts. Once the challenges were identified, the second round of interviews was conducted to ascertain the accuracy of the authors' interpretation and understanding. This serves as triangulation to independently confirm the validity of the themes identified.

Findings

Based on the information collated during the semi-structured interviews, the following points are noted:

- Although financial resources are considered as constraints, they are not foreseen as the major roadblock. One candidate has put it aptly that data analytics strategies are critical for survival, hence the organisation must source funds to launch the strategy,
- Leaderships are perceived as a strength in the organisation as the participants acknowledged that their leaders understand the importance of digitalisation and data analytics,
- The participants are asked about their knowledge of data analytics where all of them have affirmed that they are aware that data analytics strategies have disrupted traditional

business models. Most of them perceived that data analytics strategies are critical for the survival of their organisation,

- There is little resistance to implement data analytics noted in the case study organisation. As discussed in the point above, most participants are concerned that without implementing data analytics, the organisation may not survive in the long run,

- The participants acknowledged that they have little skills on data analytics. One participant highlighted that there is no need for the skills as the organisation has not implemented such strategies. With the need, the participant is confident that the staff members will acquire the techniques. Another participant highlighted that the costs to learn the new skills are not excessive.

- The case study organisation encounters a different type of data management as compared to their commercial counterparts noted in the literature review, where big data volume is a challenge. In contrast, the case study organisation does not have adequate data to perform meaningful analytics.

Table 1: Summary of challenges noted in literature review and case study organisation

Challenges	Literature review	Case study organisation
Financial resources	Lacking and are key concerns	A barrier that can be resolved. Hence not a concern.
Leadership supports	Lacking and are key concerns.	Not a concern.
Knowledge of data analytics	Lacking and are key concerns.	A barrier that can be resolved. Hence not a concern.
Resistance to changes	Major cause of failure	Not a concern.
Skill shortages	Lacking and are key concerns.	A barrier that can be resolved. Hence not a concern.
Data management	Not a concern for small organisations.	Major concern.

Discussions

The authors noted a fundamental difference between the case study organisation and those noted in the literature review - the level of leadership supports, which are commonly cited as causes for failures to launch data analytics strategies. However, it is

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quoted as a strength in the case study organisation.

Organisations noted in the literature review frequently cited a lack of financial resources and skillsets for not launching data analytics strategies. In contrast, the participants cited the lack of financial resources and skills in the case study organisation, but they are confident that alternative funding could be sourced to pay for the data analytics, and the costs of acquiring data analytics skills are not necessarily expensive.

The above findings demonstrate that once the leaders understand the importance of data analytics, they are likely to lead the organisations to overcome other obstacles, such as the lack of financial resources and skills, to implement the changes.

The findings are aligned with Sia, et al., (2021) who argued that the lack of financial resources is not the main cause for slow digitalisation. Instead, the low awareness at the top of the house and the board's culture are the main culprits (Sia, et al., 2021).

Recommendations and Conclusions

The findings from the case study organisation indicate that leaders, who understand the importance of data

analytics, are more likely to lead their organisations to launch data analytics strategies.

The relatively slow pick-up rate among the small and medium enterprises could be attributable to the lack of awareness among the leaders of the enterprises. The issues are compounded by the lack of resources and skills, which can be conveniently used as excuses to delay or reject data analytics strategies. In the case study organisation, while the participants acknowledged that financial resources and skills are lacking, they opined that these constraints must be overcome, because data analytics is too important for the organisation's survival.

Therefore, academics can play a key role to raise awareness of data analytics among the leaders of not-for-profit organisations. They can also provide training on topics such as benefits, implementation steps, and tips for successful implementations, which would encourage more organisations to embrace data analytics strategies.

Limitations

The findings of this research paper are based on one small, not-for-profit organisation in Singapore. All the participants are based in the same country. Therefore, their opinions and

insights may be influenced by the culture that exists in the country and the organisation.

The research methodology adopted for this research paper is qualitative, case study. The interview participants from the organisation were selected using the purposive sampling method, which is recommended by (Kerr, et al., 2010; Marrelli, 2007). Random sampling is not feasible due to the small number of staff (less than 20) employed by the case study organisation.

Suggestions for future research

The findings from this research paper contribute to the body of knowledge where little prior research exists. The authors opine that more research can be done in the area, and they attempt to share the knowledge, which is intended as the foundation to uncover new knowledge.

Bearing in mind the limitations discussed in the previous section, it is suggested that future research works can be performed:

- In other Asian countries, to ascertain the impact of geographical influences and cultures,
- Using a different methodology, such as quantitative research methodology

where random sampling can be adopted to collate data from different types of not-for-profit organisations. This would ascertain the impact of corporate cultures, as well as the types of organisations, on the implementation of data analytics strategies,

- Using longitudinal methodology to ascertain the impact of technology and data analytics tools on the strategies over time.

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