SINGAPORE INSTITUTE OF TECHNOLOGY

RSM

INSTITUTE OF SINGAPORE CHARTERED ACCOUNTANTS

DATA ANALYTICS ADOPTION **IN SINGAPORE SMEs**

2020

CONTENT

OVERVIEW

THE BUSINESS WORLD IS FACING TECHNOLOGY DISRUPTIONS THAT WILL RE-DEFINE BUSINESS MODELS AND STRATEGIES.

To remain relevant, businesses must embrace digitalisation and transform their business models to utilise technological advancements. Among these innovations are data and analytics, which have become the heart of technological advancement applications. Digitalisation transforms the scale, quality and processing of data. This transformation will produce vast quantities of data that businesses can use to conduct decision-making optimisation analyses to strengthen their business frontiers. Hence, it is important for all businesses to understand data generated by their businesses and to know ways to utilise advanced technologies to convert data into powerful business strategies.

In Singapore, Small and Medium-sized Enterprises (SMEs) are a vital part of the economy, contributing to about half of the Gross Domestic Product and two-thirds of employment. However, they seem to lag behind the large companies in big data analytics adoption. Often, the lower rate of adoption is attributed to certain limitations, such as cost concerns, lack of data analytics understanding or lack of in-house expertise.

This study seeks to understand the adoption of data analytics among Singapore SMEs by examining their readiness and technological capability of adopting data analytics, the extent of analytics tasks embraced, the perceived "usefulness" of data analytics, and their reasons for adopting or rejecting data analytics.

RESULTS HIGHLIGHTS

A total of 575 SMEs took part in a questionnaire survey between November 2018 and April 2020. The respondents were categorised into 3 groups:

Non-Data Analytics Adopters:
199 Respondents (34.6%)

Non-data analytics adopters are SMEs that have not adopted any data analytics in their organisations and have no intention to do so in the future. Despite their perception of the potential business values created by data analytics, these SMEs expressed scepticism that data analytics would generate real monetary savings for their organisations.

Likely Data Analytics Adopters:
202 Respondents (35.1%)

Likely data analytics adopters are SMEs that have not adopted any data analytics in their organisations but are likely to embrace it in the future. Performance expectancies, effort expectancies, management support and government support were the factors that would increase their intention to implement data analytics.

Data Analytics Adopters:
174 Respondents (30.3%)

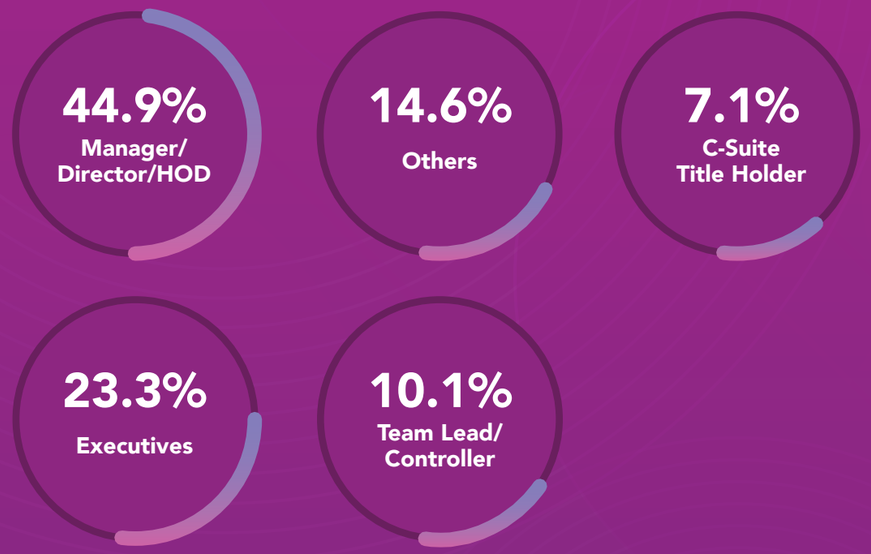
Data analytics adopters are SMEs that have already embraced data analytics in their businesses. System quality and information quality have positive impacts on data analytics business values which, in turn, lead to better organisation performance. However, lack of understanding about data analytics and concerns over data security and privacy can deter SMEs from implementing data analytics roadmaps.

There are practical implications for SMEs' management, industry associations, professional bodies, data analytics consultants and government agencies.

RESPONDENTS AND THEIR DEMOGRAPHICS

A TOTAL OF 575 VALID RESPONSES WERE COLLATED AND USED IN OUR ANALYSES.

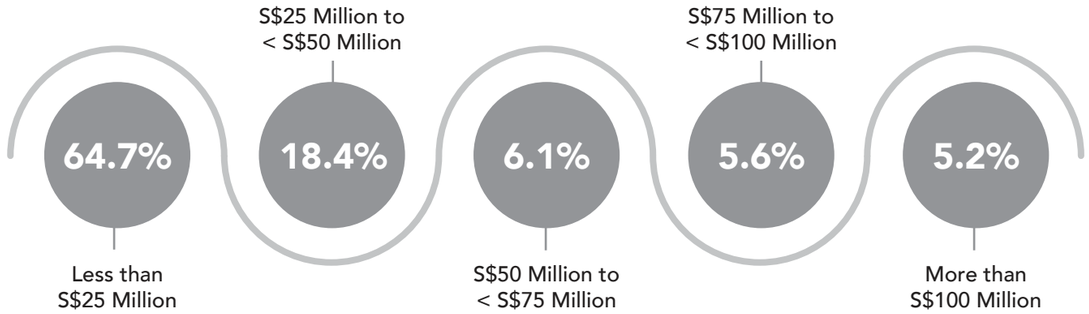
The majority of respondents were in Director/Manager/Head of Department positions. Among them, 64.7% belonged to organisations with an annual turnover of less than S$25 million. In terms of staff strength, 49.6% worked in organisations with fewer than 50 staff.



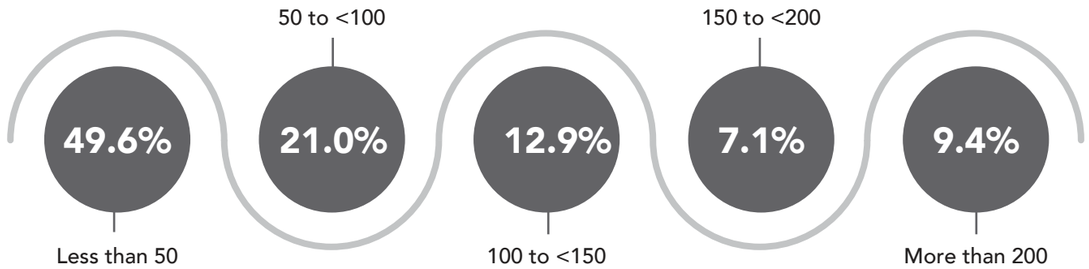
BUSINESS NATURE

Commercial & Professional Services	13.9%	Information Technology	5.2%
Engineering	9.2%	Finance	5.0%
Others	8.5%	Food, Beverage & Tobacco	5.0%
Education	6.3%	Real Estate	4.7%
Retail	5.6%	Various Industries (<5% Proportion)	36.6%

ANNUAL TURNOVER



STAFF STRENGTH



TYPES OF ADOPTERS

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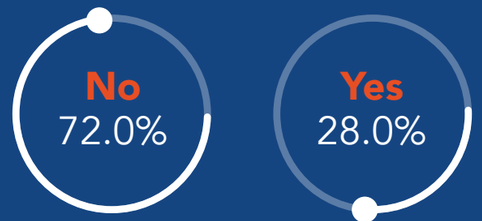
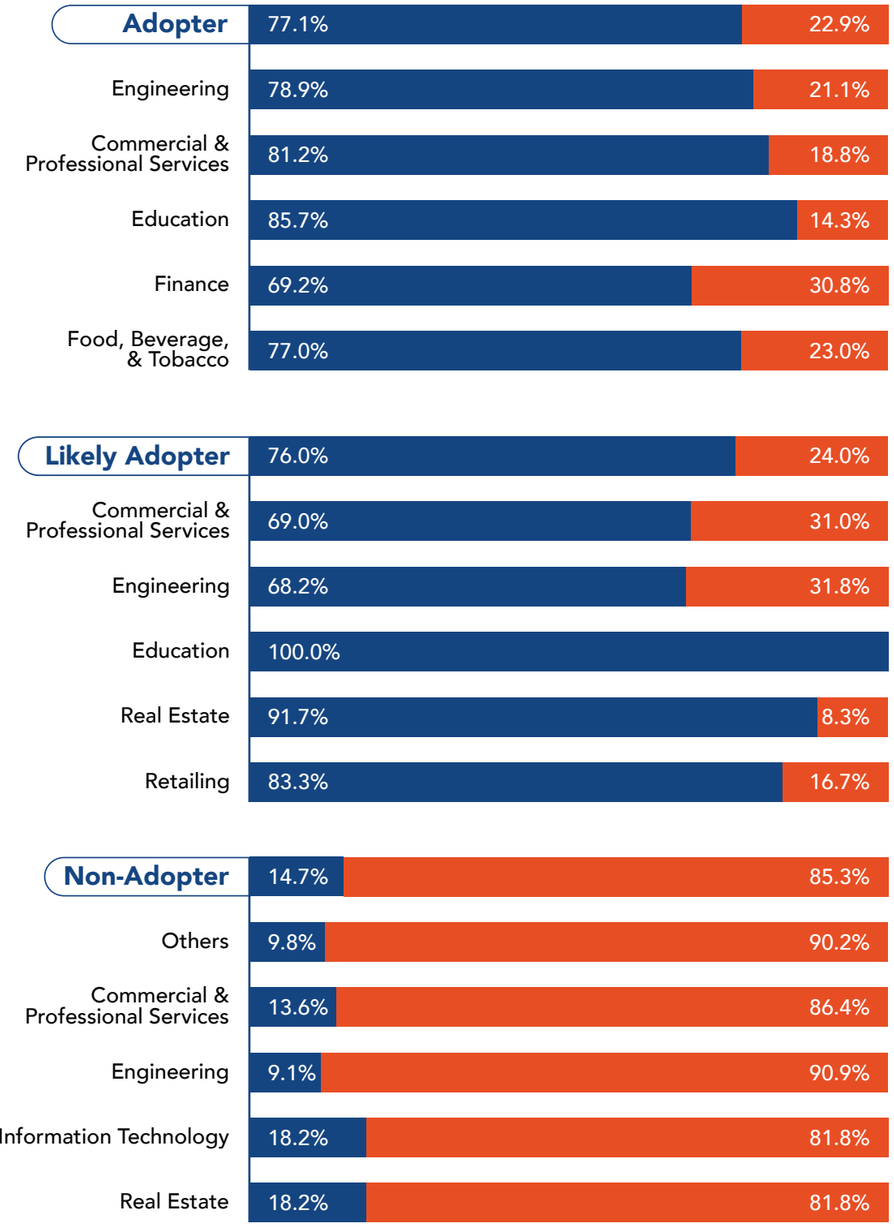
DATA ANALYTICS CAPABILITY

In terms of data analytics capability, 72.0% of all respondents did not have designated full-time staff to perform data analysis. More than 50% of the respondents reported outsourcing as a way to meet their organisations' IT needs.



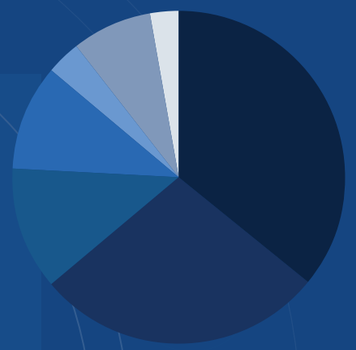
Outsourcing	52.6%
Hiring Temporary/ Part Time Staff	13.3%
Using Cloud Computing	17.9%
Headquarters	0.9%
Full Time IT Staff	14.5%
Others	0.8%

On the possibility of sending staff for data analytics training, no significant difference was seen between those who had the intention to send and those who did not (55% Yes and 45% No). However, subtle differences were found among the 3 groups of adopters and the top 5 industry sectors they were operating in. For the non-adopter group, the percentage of data analytics training was the lowest for all its 5 industry sectors.



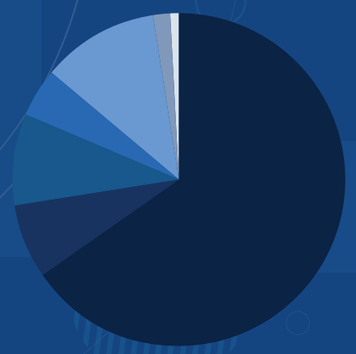
The most common reason the respondents gave for not sending staff for training was the cost factor.

Reasons Data Analytics Adopters Do Not Send Staff For Training



- 35.9% Costs
- 28.2% Time
- 12.0% No knowledge of accredited training providers
- 10.3% Unavailability of staff to attend training
- 3.4% No direct applications of data analytics to company's business
- 7.7% No direct applications of data analytics to staff's work
- 2.5% Others

Reasons Likely Data Analytics Adopters Do Not Send Staff For Training



- 65.5% Costs
- 7.1% Time
- 8.9% No knowledge of accredited training providers
- 4.8% Unavailability of staff to attend training
- 11.3% No direct applications of data analytics to company's business
- 1.8% No direct applications of data analytics to staff's work
- 0.6% Others

SOURCES OF DATA ANALYTICS AWARENESS	NON-ADOPTER	LIKELY	ADOPTER
Internet/ Mass Communication	32.0%	31.8%	28.3%
Supplier/ Vendor	12.6%	10.9%	18.0%
Seminar/ Workshop	13.7%	21.8%	23.7%
Government/Quasi Agencies/ Professional Bodies	14.7%	15.5%	18.0%
Friends/ Word of Mouth	25.9%	19.8%	11.0%
Others	1.1%	0.2%	1.0%

Most respondents across the three groups learnt about data analytics from the Internet/Mass Communication. A noticeable finding from the non-adopter group was the low response to seminar/workshop. Friends/word of mouth were a more likely source of information for non-adopters.

INSIGHTS

Non-Data Analytics Adopters: 199 Respondents (34.6%)

21.6%	Others	5.0%	Retail
11.1%	Commercial & Professional Services	4.0%	Education
5.5%	Engineering	4.0%	Food, Beverage & Tobacco
5.5%	Information Technology	3.5%	Semiconductor Equipment
5.5%	Real Estate	3.5%	Transportation

*Top 10 industry sectors

Business Value

1. **4.0/5.0** Increase efficiency of business process management
2. **4.0/5.0** Reduce operating costs
3. **4.0/5.0** Increase efficiency of workforce
4. **3.9/5.0** Increase returns on financial assets
5. **4.1/5.0** Enhance staff productivity
6. **4.0/5.0** Respond quickly to change
7. **3.9/5.0** Improve customer relations
8. **4.0/5.0** Provide better customer service

Potential Deterrents

01	Staff reluctant to change	2.3/5.0
02	Lack of understanding of data analytics	2.3/5.0
03	Lack of information systems infrastructure support	3.8/5.0
04	Shortage of data analytics expertise both in-house and in the labour market	3.7/5.0
05	Uncertainty about how to measure costs and potential benefits	2.3/5.0
06	Limited financial resources for data analytics investment	3.8/5.0
07	Lack of intuitive software	3.7/5.0
08	Concerns over data security	3.7/5.0
09	Concerns over data protection and data privacy	3.8/5.0
10	Re-assignment of personnel trained on data analytics solutions	3.6/5.0

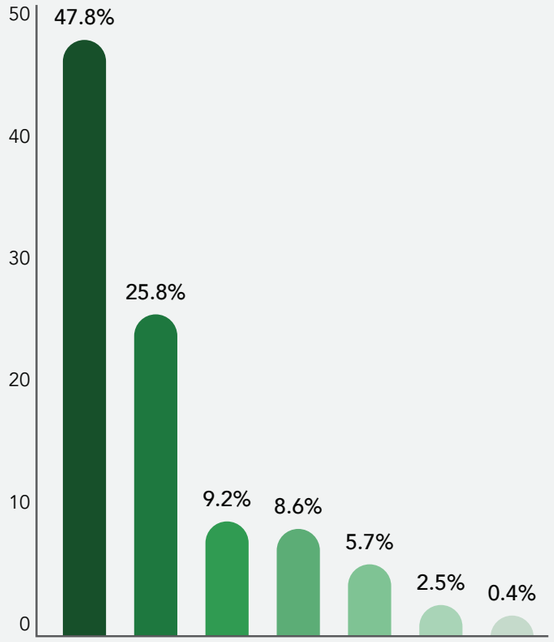
*5-point Likert scale

These respondents had not adopted any data analytics in their organisations and had no intention to do so in the future.

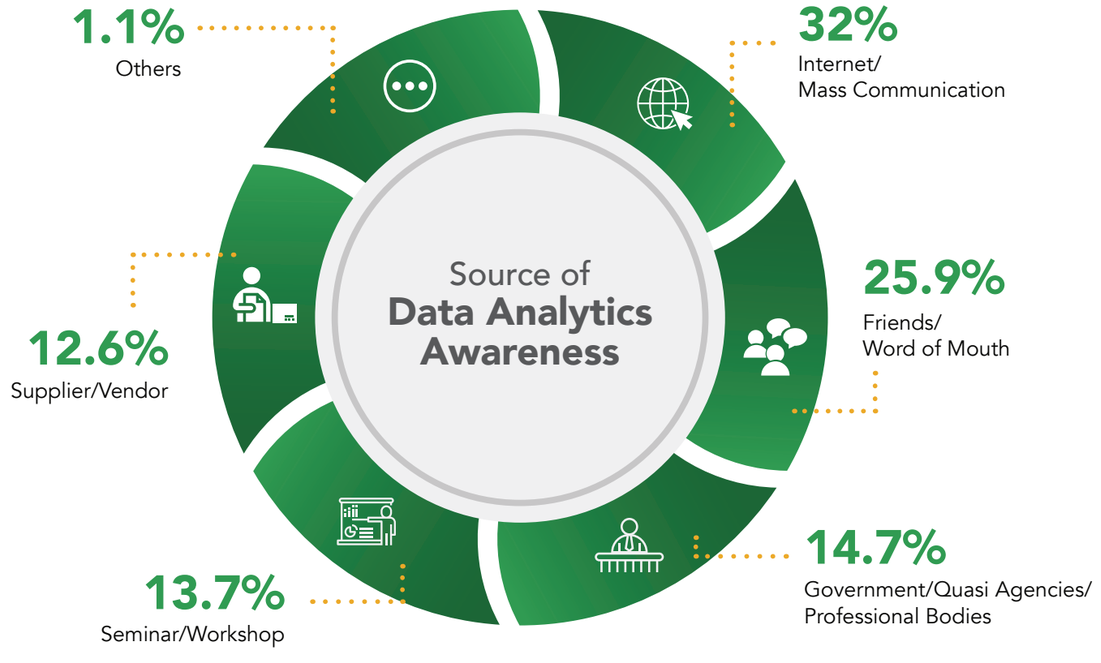
However, if they were to implement data analytics, the main driver for adoption would be enhancing staff productivity. Nonetheless, non-data analytics adopters remained sceptical over any real monetary savings that might be generated for their organisations by adopting data analytics. To encourage these SMEs to implement data analytics, more needs to be done. Sharing of success stories and providing real-life examples on how potential monetary benefits can be achieved with data analytics adoption can be considered. As success stories spread among the SMEs, more of them may be encouraged to consider embracing data analytics as part of their business model.

These respondents also reported the lack of IS infrastructure support, limited financial resources, and concern over data protection and privacy as top potential deterrents for their organisations to adopt data analytics. Many of them were familiar with only spreadsheet and database as tools of data analytics, suggesting a lack of understanding and awareness of more advanced data analytics tools.

Data Analytics Tools Overall Trend



- Opinion Crawl, Open Text, Trackur, and Semantria
- RapidMiner and Orange
- SAS, KNIME, MS Azure Machine Learning, BigML, and ApacheSpark
- Tableau, Qlik Sense, Power BI, and Microstrategy
- R and Python
- MySQL, Ms Access, SQL Server and PostgreSQL
- Google Sheet and MS Excel

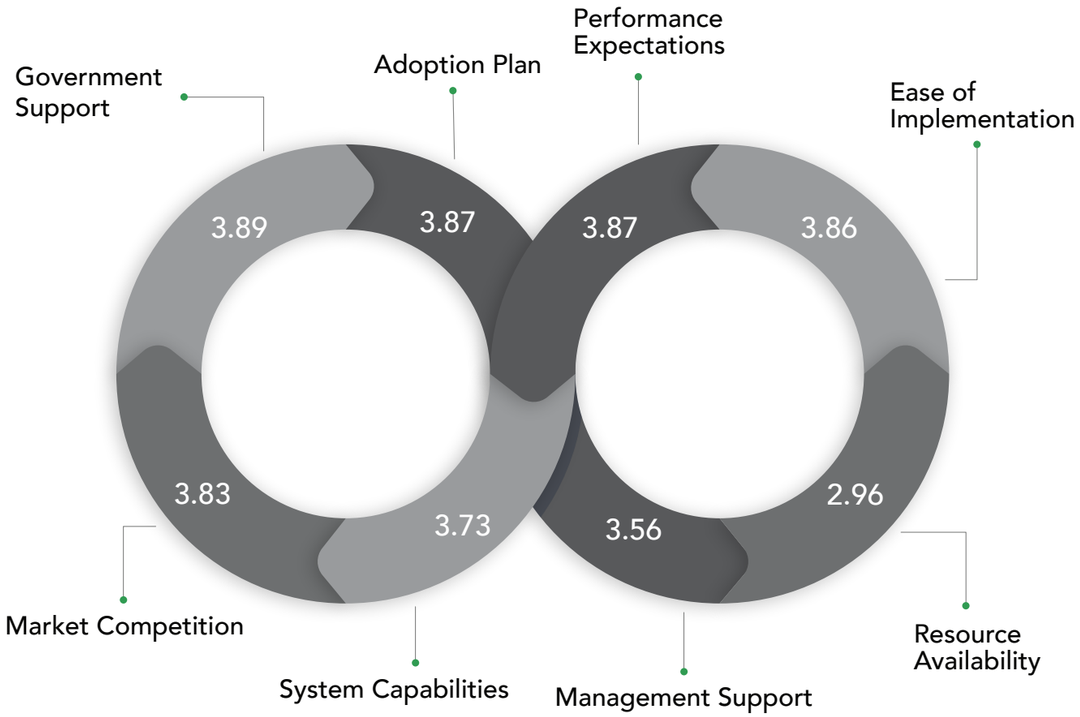


Likely Data Analytics Adopters: 202 Respondents (35.1%)

20.8%	Commercial & Professional Services	4.0%	Finance
10.9%	Engineering	4.0%	Food, Beverage & Tobacco
6.9%	Education	4.0%	Information Technology
5.9%	Real Estate	3.0%	Media & Entertainment
5.9%	Retail	3.0%	Software & Services

*Top 10 industry sectors

Contributing Factors of Implementation



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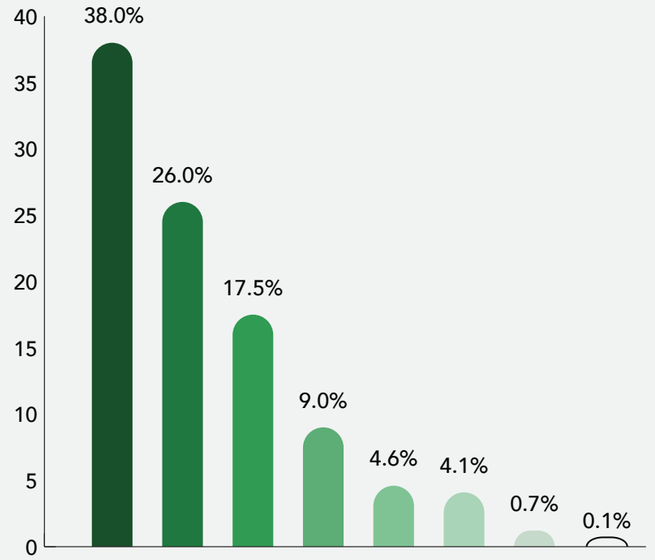
Data Analytics Tools Overall Trend



- Tableau, Qlik Sense, Power BI, and Microstrategy
- Others
- RapidMiner and Orange
- Opinion Crawl, Open Text, Trackur, and Semantria
- SAS, KNIME, MS Azure Machine Learning, BigML, and ApacheSpark
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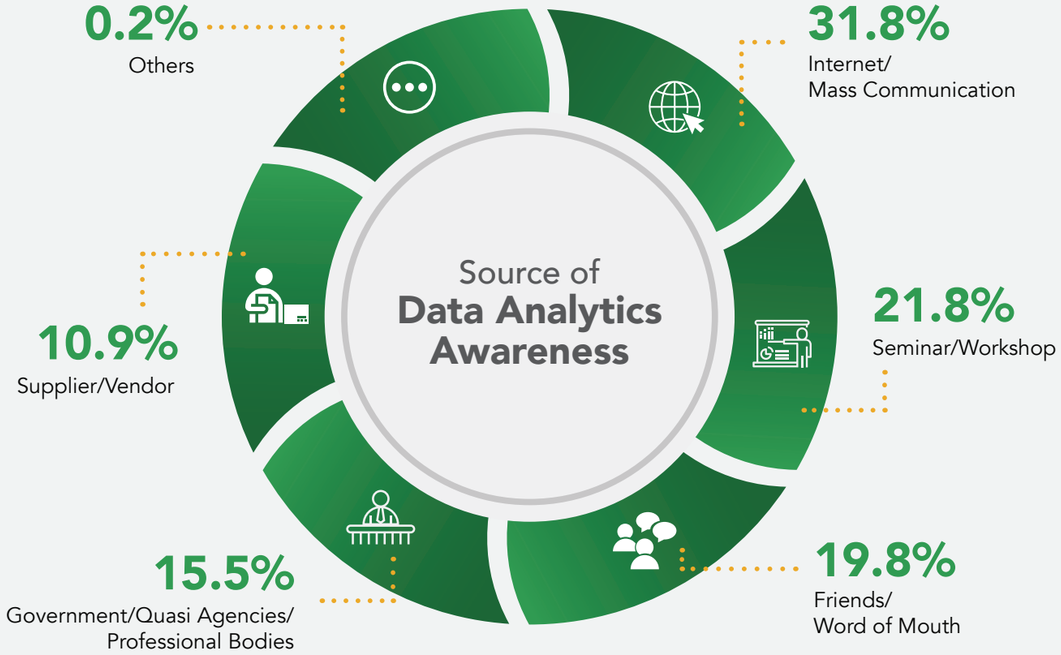
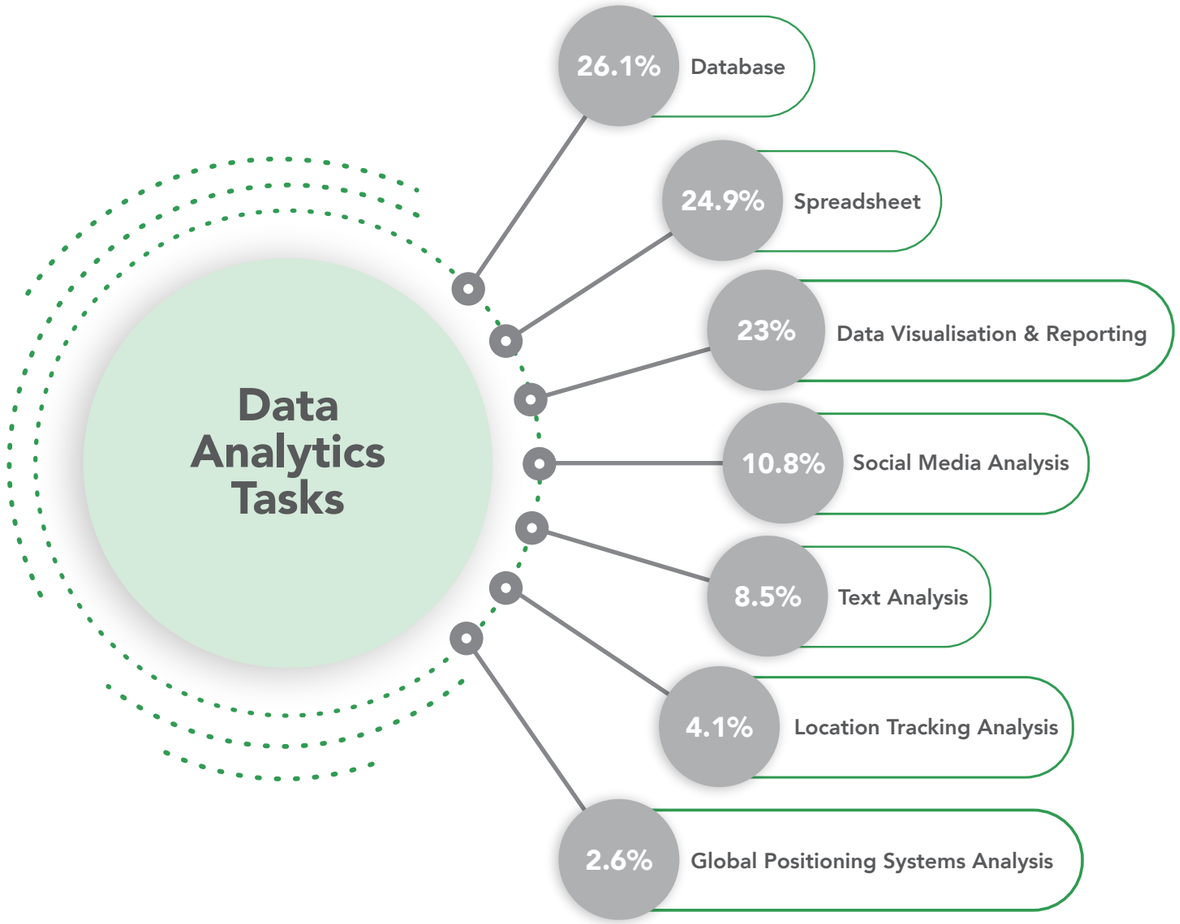


These respondents had not adopted any data analytics in their organisations but were likely to embrace it in the future.

Although they had not adopted data analytics, they were interested to implement databases, data visualisation and reporting, as well as spreadsheet applications. In particular, the most useful task for their organisations would be conducting data visualisations to provide reports and convey findings. However, this group appeared to have limited awareness about more advanced data analytics tools. The majority of them were aware of spreadsheet application analytics tools and database management, but they lacked the understanding of advanced data analytics tools for visualisation analyses or programming analyses. When these SMEs view that data analytics can help them to perform tasks and solve problems, they will likely be interested to implement such technology. Individual attributes of user experience, task usefulness or technologies capabilities do not influence their intention to adopt data analytics.



To increase their intention of data analytics implementation, these likely data analytics adopters cited government support as the chief means of assistance with implementing data analytics.

Government financial support is needed to minimise the implementation cost burden. However, while government support via grants is widely available, SMEs face difficulty tapping these grants. For some financial assistance schemes, SMEs may need to provide upfront funds to implement digitalisation transformation before they are able to take advantage of the financial schemes. For resource-scarce SMEs, a better, streamlined funding support framework is needed to entice them to implement data analytics. Other key drivers that would encourage these respondents to adopt data analytics include having a good and easy adoption implementation plan and a high expectation of realising better firm performance for their organisations. As these SMEs are open to learning about how data analytics can benefit their organisations, having a shared services platform that these SMEs can tap could be very useful in keeping cost down.

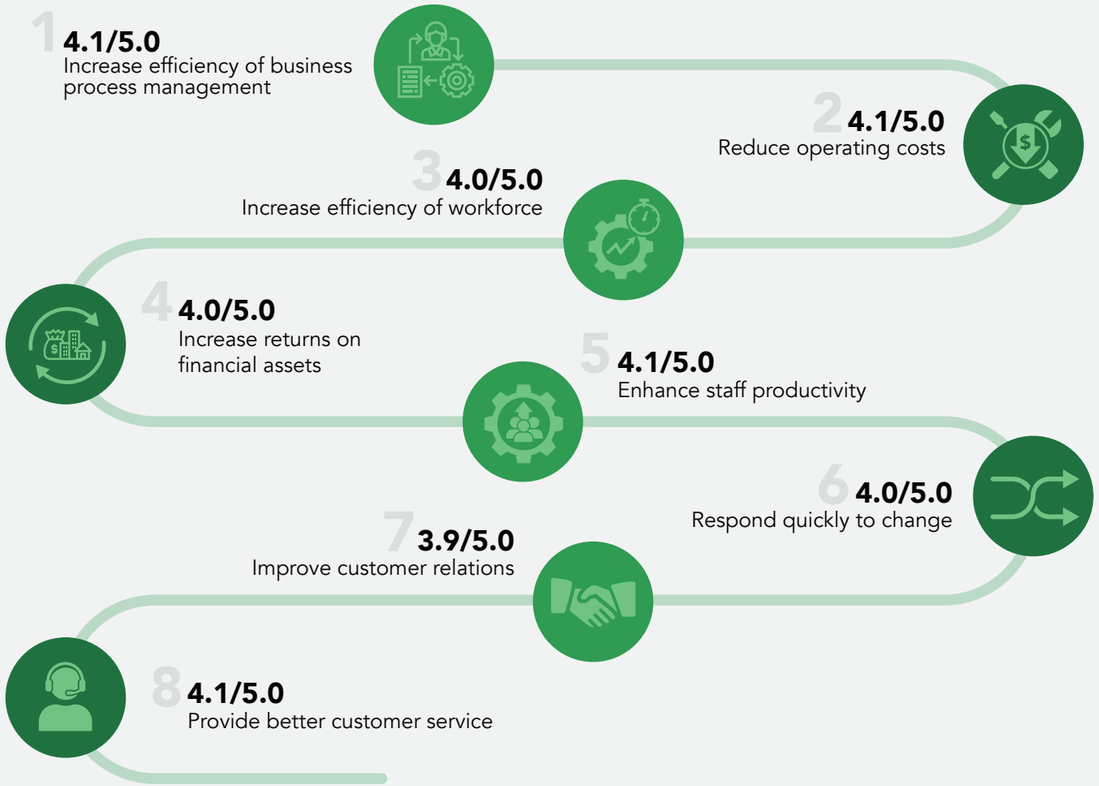
Such a platform can be set up with consultants to provide different levels of data analytics capabilities, from basic to advanced. Basic implementation refers to the use of databases and spreadsheets to arrange the vast quantities of data that businesses can use to conduct decision-making optimisation analyses. Intermediate implementation refers to the ability to produce data visualisation and reporting. Advanced implementation refers to the ability to use advanced analysis tools such as social media analysis, text analysis, location tracking analysis and global positioning systems analysis. SMEs can select the appropriate level of implementation to suit their needs.

Data Analytics Adopters:
174 Respondents
(30.3%)

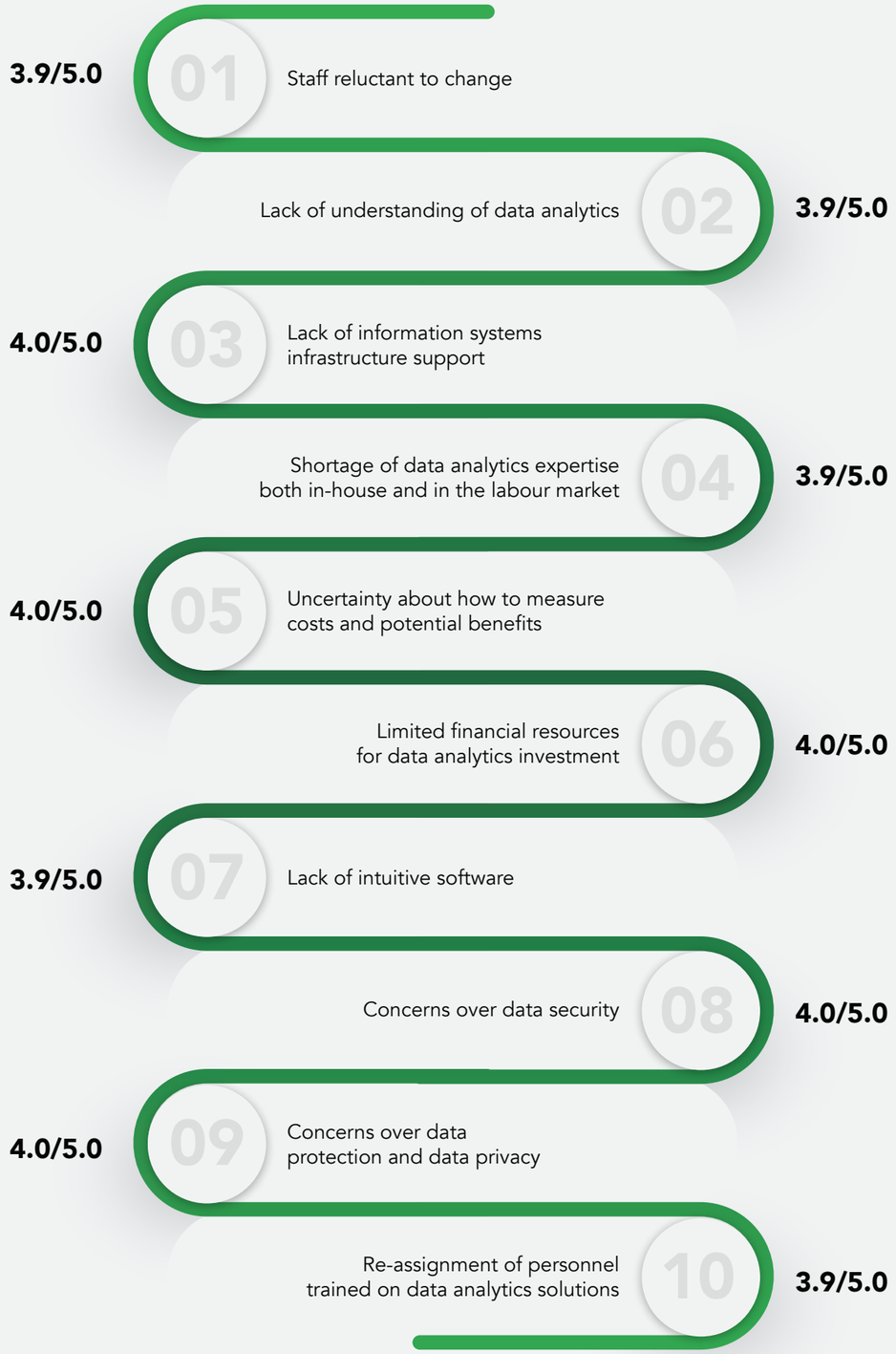
11.5%	Engineering	6.3%	Information Technology
9.2%	Commercial & Professional Services	5.7%	Retail
8.0%	Education	2.9%	Media & Entertainment
8.0%	Finance	2.9%	Technology Hardware & Equipment
7.5%	Food, Beverage & Tobacco	2.3%	Healthcare Equipment & Services

*Top 10 industry sectors

Business Value

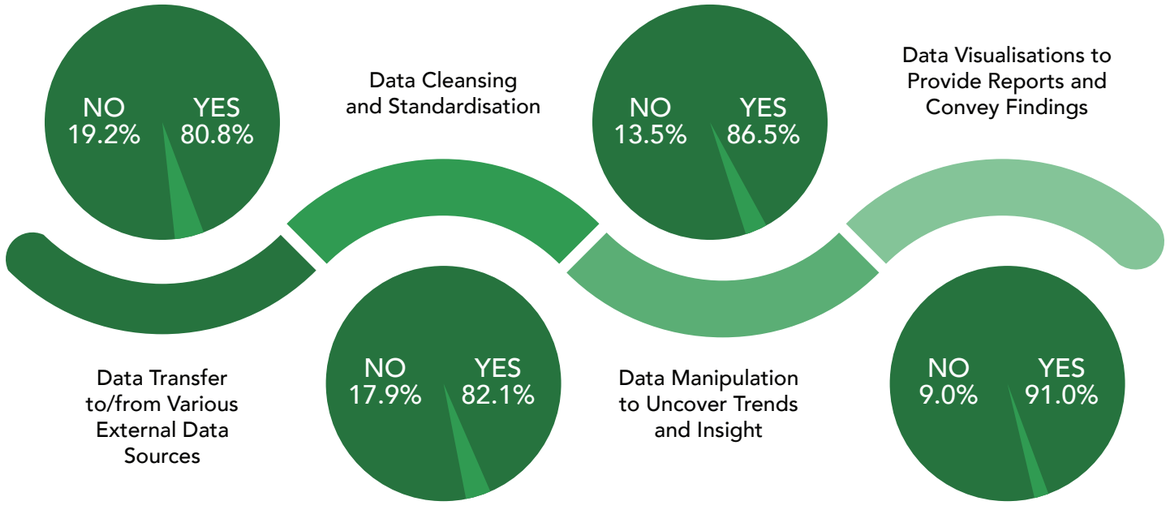


Potential Deterrents



*5-point Likert scale

Data Analytics Tasks

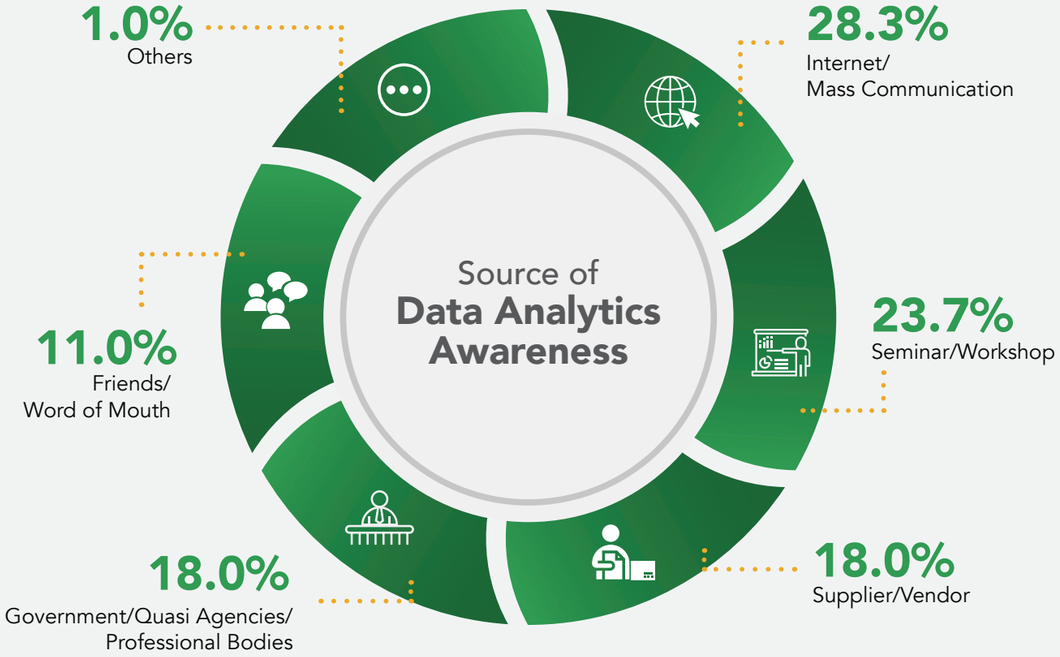


These respondents are existing data analytics adopters who believe that data analytics business values can be realised through a good system design that suits their business structure and model, as well as through quality data analytics software that is fit for use.

The data analytics tools they reported having used varied from basic software such as MS Excel to more sophisticated software such as SAS and Tableau. While many of these adopters had implemented data visualisation and reporting, they had not explored text analysis, social media analysis, global positioning systems analysis or location tracking analysis. More than 80% of the respondents indicated that they had performed various data analytics tasks such as data cleansing and standardisations, data manipulation to uncover trends and insights, and data visualisations to provide reports and convey findings. Given that these respondents are data analytics adopters, it is not surprising that most of them would report data transfer to/from various external data sources as their main task. This indicates that having good data security governance may be important and essential to these organisations.

There exists however, challenges faced by these SMEs. The lack of understanding on the benefits of technology and the inability to manage the potential uncertainty that may occur when implementing technology may result in hesitation among these SMEs to adopt more advanced data analytics. Given their limited IT resources and skills, there are also concerns over data security and privacy. While a data analytics environment was starting to emerge in their organisation, the respondents felt that data analytics might not support cross-functional or company-wide decision processes. Hence, a lack of synchronisation or a missing systematic data analytical framework within their organisations is apparent.

A supporting platform to help SMEs design a data framework to ensure seamless analyses flow will increase the chance of realising the business value brought about by data analytics and eventually, monetary benefits for the organisations.



Seminars and workshops on compliance with the Personal Data and Protection Act or on the use of advanced data analytics tools will further enhance knowledge and skills on data analytics.

CONCLUSION

In conclusion, based on our sample size, more than 69% of the respondents have not adopted data analytics although the Singapore Government has put in place various supportive measures to help SMEs transform into a digital business model. This suggests that factors other than concerns on the implementation cost are preventing these SMEs from adopting data analytics. The practical challenges these SMEs would face with implementation need to be addressed.

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